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For related information see also *Astronautics*.

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Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 302
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 306
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 307
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 308
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 308
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 309

Note: N.A. means that no abstracts were assigned to this category for this issue.

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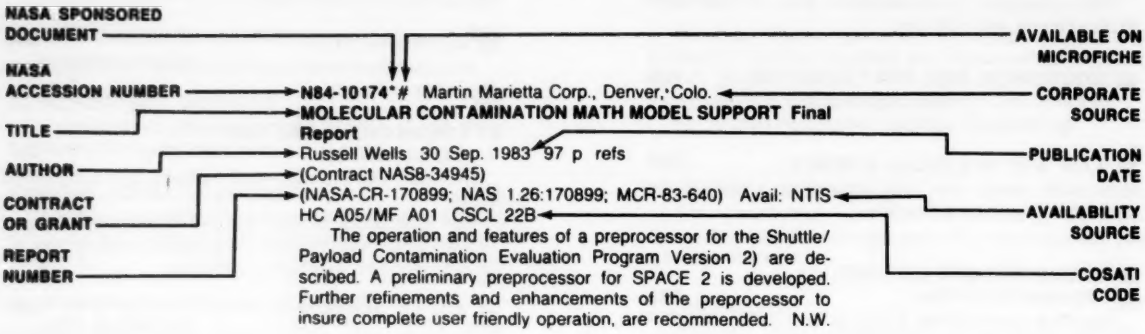
TYPICAL CITATION AND ABSTRACT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N84-10174*# Martin Marietta Corp., Denver, Colo.
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MOLECULAR CONTAMINATION MATH MODEL SUPPORT Final Report
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COSATI CODE
The operation and features of a preprocessor for the Shuttle/ Payload Contamination Evaluation Program Version 2) are described. A preliminary preprocessor for SPACE 2 is developed. Further refinements and enhancements of the preprocessor to insure complete user friendly operation, are recommended. N.W.

VOLUME 22 NUMBER 2/JANUARY 23, 1984

Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N84-11094# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION, NO. 129
20 Oct. 1983 81 p Transl. into ENGLISH from various Russian articles
(JPRS-84573) Avail: NTIS HC A05

This serial report contains news items, abstracts and articles of scientific reports on aspects of transportation including civil aviation, motor vehicles and highways, rail systems, maritime and river fleets, parts and transshipment centers, and intersector network development. For individual titles, see N84-11095 through N84-11097.

N84-11095# Joint Publications Research Service, Arlington, Va.
POOR QUALITY AIRCRAFT EXTERIOR SURFACES CAUSE GREATER FUEL EXPENDITURES
V. Sergeyev *In its* USSR Rept.: Transportation, No. 129 (JPRS-84573) 20 Oct. 1983 p 13-16 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 18 Jun. 1983 p 3 (For primary document see N84-11094 02-01)
Avail: NTIS HC A05

Economizing on fuel and energy resources has become a special problem in recent years. As was emphasized at the June Plenum of the CPSU Central Committee, salient characteristics of modern economic thinking are a truly business like nature, and a thrifty attitude toward public wealth and toward the utilization of material, labor and financial resources. A persistent struggle is now being waged for each kilogram of fuel. But still there is an entire area of work where not everything is being done yet to economize not only on kilograms, but on tens and hundreds of thousands of tons of fuel and lubricants each year. We are speaking about work directed toward improving the quality of the external surface of aircraft. Author

N84-11096# Joint Publications Research Service, Arlington, Va.
POLYURETHANE AIRCRAFT COATINGS FOR FUEL SAVINGS
A. Ovsyannikov and G. Selyukova *In its* USSR Rept.: Transportation, No. 129 (JPRS-84573) 20 Oct. 1983 p 17-19 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 5 Jul. 1983 p 2 (For primary document see N84-11094 02-01)
Avail: NTIS HC A05

One of the ways of reducing the aerodynamic resistance of the aircraft is to improve the paint coating. An entire complex of requirements are placed on paint and varnish materials that are used to protect aviation equipment. The paints should provide reliable protection of the aircraft and elements of its structure from corrosion, they should be resistant to changes in temperatures and abrasive wear and tear, minimum attraction of dirt, and a good appearance. The materials that are used at the present time for painting aircraft that are based on acrylic, epoxy and chlorovinyl copolymers do not meet requirements fully enough, which fairly frequently leads to an essential increase in the roughness and a deterioration of the aerodynamic characteristics. The nature of these materials is such that it is impossible to give them better characteristics. There is only one solution--to change over to polyurethane paint and varnish materials. Author

N84-11097# Joint Publications Research Service, Arlington, Va.
INNOVATIONS FOR IMPROVING PERFORMANCE, AERODYNAMIC PROPERTIES OF AIRCRAFT
V. Senyuta and T. Kuznetsov *In its* USSR Rept.: Transportation, No. 129 (JPRS-84573) 20 Oct. 1983 p 20-22 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 28 Jul. 1983 p 2 (For primary document see N84-11094 02-01)
Avail: NTIS HC A05

Economizing on aircraft fuel depends to a considerable degree on the efforts of workers and engineers at repair plants. The technology and the quality of riveting, or the painting of an aircraft most directly influence the aerodynamic properties of the aircraft and the expenditure of fuel. Attention is focused on the quality of the external surface of the aircraft as a means of reducing the fuel consumption. B.G.

N84-11098*# Operations Research, Inc., Silver Spring, Md.
AERONAUTICS SYSTEMS TECHNOLOGY STUDIES Final Report
James S. Bauchspies Oct. 1983 33 p
(Contract NASw-3554)
(NASA-CR-174572; NAS 1\26:174572) Avail: NTIS HC A03/MF A01 CSCL 01B

Data collection and analysis in the areas of air transportation, aircraft manufacturing and sales, airline operations, market projections, internal trade, and energy consumption; legislation and regulations, technology needs; surveys; decision-making; cost analyses; and technology transfer are discussed. N.W.

N84-11099*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1982
Washington Oct. 1983 147 p refs Conf. held in Hampton, Va., 10 Dec. 1982
(NASA-CP-2285; L-15688; NAS 1.55:2285) Avail: NTIS HC A07/MF A01 CSCL 01B

A summary of the research on air transportation is addressed including navigation; guidance, control and display concepts; and hardware, with special emphasis on applications to general aviation aircraft. Completed works and status reports are presented also included are annotated bibliographies of all published research sponsored on these grants since 1972. For individual titles, see N84-11100 through N84-11111.

N84-11100*# Ohio Univ., Athens. Center for Avionics Engineering.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT OHIO UNIVERSITY, 1982 c03
Richard H. McFarland *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 3-6 refs

(For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

Refinement of the Loran-C receiver system for general aviation use was described. The capability to provide area navigation sometimes called random navigation (RNAV) was accomplished by providing new software. Microcomputers were used to accomplish the calculations which were performed in flight to demonstrate these devices are cost effective in the implementation of Loran-C navigational information. B.G.

N84-11101*# Ohio Univ., Athens. Center for Avionics Engineering.
ENHANCED CHARACTER SIZES FOR THE VDM-1 VIDEO DISPLAY BOARD c06
Stanley M. Novacki, III and James D. Nickum *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 9-22 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01D

Use of a microprocessor for providing navigation information from the inherent hyperbolic geometries of Loran-C was discussed. The advantages Loran-C offers over VOR/DME as a primary navigation aid are identified. These advantages include long range coverage by several stations, coverage at low altitudes, and the capability to have nonprecision approaches at airports not already served by landing aids. Modern digital electronic technology is used to produce a device to convert Loran-C data to useful pilot information using simple software algorithms and low cost microprocessor devices. The cost and lack of availability of suitable processors to execute these algorithms have prevented a Loran-C navigator from being developed. Results indicate that the microprocessor based Loran-C navigator has an accuracy of 1.0 nm or less over an area typically covered by a triad of Loran-C stations and can execute a position update in less than 0.2 seconds.
Author

N84-11102*# Ohio Univ., Athens. Center for Avionics Engineering.
RF FRONT END INTERFACE AND AGC MODIFICATION c04
Stephen R. Yost *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 23-32 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

Preliminary results indicate that the new front end automatic gain control (AGC) combination perform satisfactorily. Side by side bench tests with Trimble 10A and Texas Instruments 9900 LORAN-C receivers have proven that the proper time differences are being obtained. Further optimization of the AGC circuit will occur as software to track all of the stations in a LORAN-C chain is developed. The AGC circuit was designed to sample up to six separate LORAN-C stations. Along with expanded station tracking software, a more sophisticated search routine is also under development. A printed circuit board for the AGC is planned and will be enclosed with the RF front end in a sealed enclosure to reduce interference from the other digital circuits of the microcomputer. B.G.

N84-11103*# Ohio Univ., Athens. Center for Avionics Engineering.
PRELIMINARY DESCRIPTION OF THE AREA NAVIGATION SOFTWARE FOR A MICROCOMPUTER-BASED LORAN-C RECEIVER c04
Fujiko Oguri *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 33-43 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

The development of new software implementation of this software on a microcomputer (MOS 6502) to provide high quality navigation information is described. This software development provides Area/Route Navigation (RNAV) information from Time Differences (TDs) in raw form using an elliptical Earth model and a spherical model. The software is prepared for the microcomputer based Loran-C receiver. To compute navigation infomation, a (MOS 6502) microcomputer and a mathematical chip (AM 9511A) were combined with the Loran-C receiver. Final data reveals that this software does indeed provide accurate information with reasonable execution times. Author

N84-11104*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT MIT c03
Robert W. Simpson *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 75-80 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

A summary of the research done by the Massachusetts Institute of Technology is addressed including Loran-C for guidance in flying approaches, an air traffic control simulator for the Manned Vehicle Simulation Research Facility, and an air traffic collision model theory. B.G.

N84-11105*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
LATERAL RUNWAY APPROACH GUIDANCE USING LORAN-C c06
Robert W. Simpson *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 81-87 (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01D

The design and flight test of a lateral guidance system for flying approaches to a runway by general aviation aircraft are examined. The issue is whether or not good dynamic response can be obtained by exploiting the repeatable accuracy of Loran-C position data and combining it with heading rate data. The pilot needs cross pointer displays so he can keep the aircraft within approx. 75 feet of the runway centerline at approach speeds typical of general aviation aircraft. B.G.

N84-11106*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
DEVELOPMENT OF REAL-TIME ATC SIMULATION FACILITY c09
John Pararas *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 89-98 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01E

The Flight Transportation Laboratory has developed a real time interactive Air Traffic Control simulation facility designed to provide a versatile and easy to use tool for research and experimentation involving air traffic control. The facility uses a VAX-11/750 as the central computer. The SANDERS GRAPHICS-7 display system is used to simulate air traffic control displays. Pseudo-pilot displays are provided on Texas Instruments TI940 video terminals. Finally, a custom designed audio system driven by a Z-80 and interfaced with the VAX provides voice communication between the air traffic controllers and the pseudo-pilots. The audio system provides computer controlled voice disguising and thus allows each aircraft to have its own audio characteristics and provides an added realism to the experiment. The facility can accomodate multiple controller stations and pseudo-pilot stations. Each station is manned by a single operator who has a large repertoire of commands with which to control his/her display and the simulated aircraft under his/her jurisdiction. An additional console and a distinct set of commands allow full controllability of the simulation environment by the experimenter in real time. B.G.

N84-11107*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
RELATIVE-DATUM LORAN NAVIGATION c04
Antonio Elias *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 99-105 (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

For short range navigation around an airport, there are

operational and computational advantages in changing the reference frame for Loran navigation of the normal latitude-longitude frame to a tangential local reference plane. This is called "Relative Datum Loran Navigation" since it is centered at a selected reference point (such as a runway touchdown point) whose time differences (TD's) in a given Loran grid accurately surveyed. If the receiver TD's are related to this datum to produce a relative TD (delta TD), the computation of its position in the x,y local reference plane can be computed easily using two linked linear equations which have four known constant coefficients. The TD's of all touchdown points and these four coefficients in order to provide x,y in local reference planes related to each runway can be stored. Author

N84-11108*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT PRINCETON UNIVERSITY **c03**
Robert F. Stengel *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 109-115 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

The Air Transportation Technology Program at Princeton University, a program emphasizing graduate and undergraduate student research, proceeded along six avenues during the past year: investigation of fuel use characteristics of general aviation aircraft, experimentation with an ultrasonic altimeter, single pilot instrument flight, application of fiber optics in flight control systems, voice recognition inputs for navigation/communication receiver tuning, and computer aided aircraft design. Author

N84-11109*# Princeton Univ., N. J. Lab. for Flight Research.
COCKPIT VOICE RECOGNITION PROGRAM AT PRINCETON UNIVERSITY **c04**
Chien Y. Huang *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 117-132 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

Voice recognition technology (VRT) is applied to aeronautics, particularly on the pilot workload alleviation. The VRT does not have to prove its maturity any longer. The feasibility of voice tuning of radio and DME are demonstrated since there are immediate advantages to the pilot and can be completed in a reasonable time. Author

N84-11110*# Princeton Univ., N. J. Lab. for Flight Research.
DISTRIBUTED PROCESSING AND FIBER OPTIC COMMUNICATIONS IN AIR DATA MEASUREMENTS **c04**
Kristin A. Farry and Robert F. Stengel *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 133-139 refs Previously announced as A83-11258 (For primary document see N84-11099 02-01)
(Contracts NGL-31-001-252; N00014-78-C-0257)
Avail: NTIS HC A07/MF A01 CSCL 17G

The application of distributed processing, fiber optics, and hardware redundancy to collecting airstream data in Princeton's digitally controlled Variable-Response Research Aircraft (VRA) is described. Microprocessor controlled instrumentation packages in each wingtip of the aircraft collect angle of attack and sideslip data in digital form; after scaling, filtering, and calibrating the data, they send it to the aircraft's microprocessor Digital Flight Control System (micro-DFCS) via digital fiber optic data links. Each wingtip's package is independent of the other; therefore, the system has dual hardware redundancy. The fiber optic link design is presented as well as a description of the calibration and communications software. Author

N84-11111*# Princeton Univ., N. J.
DATA ACQUISITION FOR STALL/SPIN FLIGHT RESEARCH **c08**
M. SriJayantha *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 141-156 (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

A special purpose digital data acquisition system is built for stall/spin flight research. A Schweizer 2-32 sailplane is used as the test vehicle. Computer hardware and its architecture are described. Concepts of system failure detection are considered in the design. Special instrumentation developed for the high angle of attack flight is presented. A representative flight time history of a maneuver also is shown. The flight data will be used for the identification of aerodynamic parameters. Author

N84-11112# Committee on Science and Technology (U. S. House).
AIRCRAFT MAINTENANCE AND FIRE
Washington GPO 1983 226 p refs Hearing before the Subcomm. on Transportation, Aviation and Materials of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 15, 27 Jun. 1983
(GPO-24-247) Avail: Subcommittee on Transportation, Aviation and Materials

The setting of cabin fire safety standards by the FAA and the need for improving service difficulty reporting system are discussed as well as NASA's efforts in developing fire-blocked seats and fireworthy cabin materials, windows, and fuels. Cooperation with the aircraft industry is examined including annual feedback on airworthiness. A.R.H.

N84-11113# Naval Fleet Material Support Office, Mechanicsburg, Pa. Operations Analysis Div.
RIM-AIR (REPAIRABLE INTEGRATED MODEL FOR AVIATION) STUDY
Frank C. Strauch and Jeffrey W. Gardner 30 Jun. 1983 107 p (AD-A131141; Rept-155) Avail: NTIS HC A06/MF A01 CSCL 12/1

Naval Supply Systems Command proposed the Repairable Integrated Model for Aviation (RIM-AIR) model to compute Aviation Consolidated Allowance List (AVCAL) requirements during the provisioning the AVCAL development processes at Navy Aviation Supply Office (ASO). The AVCAL is a consolidated listing of the range and depth of aeronautical material required by ships, Marine Air Groups, and Naval Air Stations to support aircraft operations. RIM-AIR was designed to eliminate the dichotomy between the material availability goals and stockage criteria promulgated in OPNAVINST 4441.12A while complying with the policy established by DODIS 4140.45, 4140.46, and 4140.47. This report analyzes alternative range and safety level criteria for RIM-AIR, recommends specific alternatives and discusses issues relevant to the implementation of these recommendations. Author (GRA)

N84-11114# Air Force Logistics Command, Wright-Patterson AFB, Ohio.
THE EFFECT OF AIRCRAFT AGE AND FLYING HOURS ON MAINTENANCE COSTS Final Technical Report
N. W. Foster and H. D. Hunsaker Jun. 1983 43 p refs
(AD-A131534; AFLC-TR-82-099) Avail: NTIS HC A03/MF A01 CSCL 01/2

This study was accomplished to investigate the effect of age and flying hours on costs to maintain an aircraft. Available literature was searched on the subject. Depot maintenance cost data for eight years were utilized to compare the costs of different models of four basic aircraft. The different models compared reflect different aircraft age and number of flying hours with similar missions. Author (GRA)

N84-11115# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
[AEROSPACE RESEARCH ACTIVITIES IN WEST GERMANY] Annual Report, 1981/82
Apr. 1983 127 p
Avail: NTIS HC A07/MF A01

Transport and communications systems; aircraft and spacecraft technology; remote sensing; and energetics and propulsion research is summarized. Flight mechanics; fluid mechanics; materials and structures; wind tunnel investigations; and human factors engineering activities are described. Author (ESA)

N84-11116# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AEROELASTIC CONSIDERATIONS IN THE PRELIMINARY DESIGN OF AIRCRAFT
Loughton, England Sep. 1983 322 p refs In ENGLISH and FRENCH Conf. held in London, 11-12 Apr. 1983
(AGARD-CP-354; ISBN-92-835-0338-4) Avail: NTIS HC A14/MF A01

The latest trends in aeroelastic analysis, aeroelastic tailoring, structural optimization and flutter optimization are reviewed. The application of these techniques to aircraft design is discussed. For individual titles, see N84-11117 through N84-11135.

N84-11117# Lockheed-California Co., Burbank. Advanced Flutter and Dynamics Methods.
PRELIMINARY AEROELASTIC DESIGN OF STRUCTURES (PADS) METHODS DEVELOPMENT AND APPLICATION c05
N. A. Radovcich *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 29 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Preliminary Aeroelastic Design of Structures (PADS) is a highly computerized design system for generating structural weight data which include aeroelastic effects for advanced aircraft configurations. These data can then be used to update the statistical and semianalytical weight data base during configuration tradeoff studies. Three aspects of PADS are discussed: the formulation of computer operating system technology and data management techniques which will permit the definition and execution of engineering processes in a user friendly environment; a definition of engineering processes for preliminary aeroelastic design of structures which may be used to design an aircraft for strength and stiffness in the elapsed time normally available for a conceptual design phase; and the presentation of results from the PADS validation effort, computer software as well as engineering processes, using a known airplane design data base. R.J.F.

N84-11118# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
AEROSPATIAL'ES APPROACH TO THE STUDY OF FLUTTER AT THE DESIGN STAGE OF THE PROJECT [APPROCHE AEROSPATIALE DE L'ETUDE DU FLOTTEMENT AU NIVEAU DE L'AVANT-PROJET] c08
Michel Curbillon *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 32 p refs In FRENCH; ENGLISH summary (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Because of its importance from the point of view of safety and certification, the flutter behavior of a plane must be estimated as soon as possible in the study of a project. In fact, geometry, structural conception, and sizing could be strongly influenced by this phenomena. The problem is formulated in order to present the most important factors. The objectives of the flutter study at the design stage are defined. The approach of the simplified mathematical model, normal modes and flutter calculations are exposed. Examples from aerospatiale studies are included. Author

N84-11119# Boeing Military Airplane Development, Seattle, Wash.
AEROELASTIC TAILORING OF HIGH-ASPECT-RATIO COMPOSITE WINGS IN THE TRANSONIC REGIME c05
C. J. Borland and D. W. Gimmestad *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

A procedure for coupling a rapid, accurate transonic aeroelastic analysis method, based on nonlinear small disturbance theory, with a simple design optimization method for high aspect ratio composite box beam type structures is described. A sample aeroelastically tailored preliminary design employing nonlinear transonic aerodynamics is presented. Currently available aeroelastic tailoring methods for composite aircraft structure employ linearized analysis of aeroelastic loads in the optimization cycle. For aircraft whose primary structural design conditions lie in the transonic regime, however, these loads may be considerably in error and may therefore lead to an other than optimum design. For aircraft with advanced technology or supercritical airfoil sections, the aerodynamic loading is extremely sensitive to changes in shock position and strength, which are affected in turn by small changes in geometry due to aeroelastic loading. R.J.F.

N84-11120# British Aerospace Aircraft Group, Weybridge (England).
AEROELASTIC DESIGN OF CIVIL TRANSPORTS AT THE PROJECT STAGE c05
R. E. J. Brazier, A. E. Dudman, and B. W. Payne *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 11 p (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

The concepts of aeroelastic design of civil transports at the project stage are outlined. The formulation of the data and computing requirements are described, as well as the aeroelastic predictions to the project design. The design of a competitive civil transport aircraft must take account of aeroelastic effects and aeroelastic requirements at the project stage. The overall design will be decided by other considerations but the final tuning of the design, leading to structural/performance optimization has to include aeroelastic data on static distortion, dynamic loading and flutter requirements. In order to be able to produce these data at the project stage, where geometry and configuration changes need to be assessed rapidly, a system was developed by which quick and reliable predictions can be made. R.J.F.

N84-11121# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
TRANSONIC FLUTTER CLEARANCE FOR A SUPERCRITICAL TRANSPORT AIRCRAFT IN THE PRELIMINARY STAGE c08
N. Pronk, H. Walgemoed, and R. J. Zwaan (NLR, Amsterdam) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 13 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Recently, design studies for a short haul transport with a supercritical wing were made. One of the aeroelastic questions to be answered already in the preliminary design phase of these wings was the question of flutter freedom in the foreseen flight envelope. A survey is given of the steps taken in the flutter clearance, especially those which were prompted by the transonic aspects. Aerodynamic investigations are discussed involving transonic wind tunnel tests on oscillating supercritical airfoils, transonic flutter tests on a supercritical wing model and the development of calculation methods. A flutter analysis method for these transonic conditions is verified on the wind tunnel model results and applied to the full scale design, showing the influence of the transonic aerodynamics. R.J.F.

N84-11122# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).
INFLUENCE OF MAIN DESIGN PARAMETERS ON FLUTTER BEHAVIOUR FOR AIRCRAFT CONFIGURATIONS WITH HEAVY CONCENTRATED MASSES c08
Helmut Zimmerman and Siegfried Vogel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 11 p ref (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Heavy concentrated masses fitted elastically to the wing can induce flutter in an aircraft. This flutter case is well known for fighter aircraft with certain store configurations. For transport aircraft this flutter case becomes more and more important especially for wing engined aircraft with heavy engines, and modern transonic profiles. The structural and aerodynamic influence parameters for this flutter case are described for a particular project. A flutter speed inside the flight envelope caused by this type of flutter can only be prevented by taking account of aeroelastic criteria and their influence on the early design of the aircraft. For a frozen design this flutter case can only be prevented by penalizing the weight and drag properties of the aircraft. Because transonic

aerodynamics also decreases the flutter speed (known as the transonic dip) for aircraft with modern transonic profiles this flutter case deserves special consideration. Author

N84-11123# De Havilland Aircraft Co. of Canada Ltd., Downsview (Ontario).
AEROELASTIC DESIGN CONSIDERATIONS FOR TURBOPROP POWERPLANT INSTALLATIONS **c07**
John J. Glaser *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 18 p refs Sponsored in part by Dept. of National Defence and National Research Council of Canada (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Experience gained in designing turboprop powerplant suspension systems to minimize vibrations resulting from propeller unbalance is discussed. An overview is first given of turboprop suspension considerations including whirl flutter, vibration isolation and landing loads. This is followed by an outline of the design evolution of the DHC-7 suspension system proven sucessful in service. The design features of the DHC-8 system, currently under development, are also prepared. Recommendations pertinent to preliminary design and development are given. R.J.F.

N84-11124# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE DEVELOPMENT OF FAST-FLOW (A PROGRAM FOR FLUTTER OPTIMIZATION TO SATISFY MULTIPLE FLUTTER REQUIREMENTS) **c08**
Bruce A. Rommel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

FAST-FLOW is being developed as a production program for finite element flutter optimization. This program is the third step in an automated sequential structural design process that begins with an optimization for buckling and static strength. FAST-FLOW features a user selected design optimization procedures such as the feasible direction design search in CONMIN or a criteria optimizer to provide the structural resizing. Multiple flutter requirements resulting from variations in payload, fuel state, speed, and altitude are simultaneously satisfied FAST-FLOW tracks both flutter speed and hump mode damping factors in design space. Second order Taylor approximations of the flutter speeds and hump mode damping factors may be updated periodically during a fully automated design cycle. During an update, the model is resembled in modal form, modes are updated, and the location of the flutter speeds and hump modes is reestablished. Then, the gradient and Hessian matrices used in the Taylor approximations for each requirement are updated. These design sensitivities are then used in a fast redesign cycle with the optimizer until the design converges or a new update is required. Program architectural considerations are presented and contrasted with standard structural analysis programs. The impact of finite element dynamics on standard production flutter analysis procedures is also discussed. Author

N84-11125# Royal Aircraft Establishment, Farnborough (England).
THE INITIAL DESIGN OF ACTIVE CONTROL SYSTEMS FOR A FLEXIBLE AIRCRAFT **c08**
I. W. Kaynes and D. E. Fry *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Methods have been developed for designing active control systems to alleviate the symmetric loads due to vertical gusts on a flexible aircraft. Techniques for choosing sensor positions and system gains are demonstrated, with the interpretation of results being aided by graphical methods that allow easy assessment of conflicting objectives and system constraints. A relatively simple model shows that loads in continuous turbulence can be alleviated by at least 50%, with ailerons driven by feedback signals from accelerometers at the center of gravity and on the wing and with pitch stability augmented using the elevators. Maneuverable loads are also alleviated. The methods are shown to be useful for predicting the potential of active controls at an early stage of design definition. The possibility of slight degradations from a number of sources is assessed, including more complex representations of the aileron actuator and the sensors, aileron rate limitations and different choices of gust model. Author

N84-11126# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
AEROELASTIC DESIGN CONSIDERATIONS IN THE DEVELOPMENT OF HELICOPTERS **c05**
H. Strehlow and B. Enenkl *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 25 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

There are a number of aeroelastic phenomena associated with the design of helicopters. The dynamic stability and response characteristics of rotary wing aircraft are dependent on parameters which have to be defined in the preliminary design phase. The type of rotor and its control determine largely the aeroelastic behavior of a helicopter. Of special interest are nowadays hingeless and bearingless rotor systems. Aeroelastic design considerations for these rotor types are discussed. Coupling effects due to geometric nonlinearities and blade root attachments with recone, droop, sweep and offsets are of great importance with respect to the aeroelastic stability and must be considered carefully in a preliminary phase. In addition, stability and vibration problems call for exact blade tuning possibilities, which in turn require an analytical understanding. Coupling between rotor and fuselage may have significant effects on aeroelastic stability and response. Design parameters related to this complex area are also discussed. Author

N84-11127# Westland Helicopters Ltd., Yeovil (England).
THE INFLUENCE OF AEROELASTIC STABILITY REQUIREMENTS ON HELICOPTER DESIGN **c08**
S. P. King *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

The avoidance of aeroelastic and aeromechanical instabilities is a prime objective of aircraft design, and must be considered throughout the design cycle. Due to lack of data the analysis of instabilities during preliminary design is a difficult task, consequently simple models may be more useful than large and complex analyses. A number of potential instabilities are discussed; blade flutter; main rotor flap lag stability; tail rotor pitch flap lag and the complete aircraft problems of ground and air resonance. In each case a description of the mechanism involved in the instability is given and a simple analytic tool for its investigation is suggested. Author

N84-11128# Sikorsky Aircraft, Stratford, Conn.
AEROELASTIC CONSIDERATIONS IN THE DESIGN OF HIGH SPEED ROTORS **c05**
Wen-Liu Miao and Robert H. Blackwell *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 16 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

The high speed requirement dictates that the rotor design be simple and clean. Elimination of blade articulations as well as pitch bearings and lag dampers is emerging as a candidate technology for such a rotor. The resulting bearingless type rotor design has to deal with the question of rotor stability and the coupled rotor/airframe stability. The merits of the stiff inplane design versus the soft inplane design in light of the stability issues are discussed. The philosophy of introducing blade bending torsion couplings to improve stability characteristics is substantiated. As vibration potential increases with airspeed exponentially and may become a limiting factor to the speed achievable, reducing vibration should be an integral part of the aeroelastic considerations for high speed rotor. Parameters that can reduce vibrations are discussed generically. Sensitivities of vibration are shown for blade bending and torsion stiffnesses, mass distribution, frequency and mode shape. Author

N84-11129# Societe Nationale Industrielle Aerospatiale, Marignane (France.)
ESTIMATED ANALYSIS OF THE AEROELASTIC BEHAVIOR OF TAIL ROTORS [ANALYSE PREVIONNELLE DU COMPORTEMENT AEROELASTIQUE DES ROTORS ARRIERE] c05
G. Genoux and G. Blachere *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 22 p refs In FRENCH (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

A relatively precise knowledge of the aeroelastic behavior of helicopter rotors is necessary for their optimum sizing and maximum safety. In the case of tail rotors, behavior prediction is complex because of the dynamic environment, aerodynamics, and their particular operating conditions (passage range, important twisting action, regime...). Complete modeling of the behavior of the anti-torque rt rotor and of helicopter structure is difficult at the estimation stage. Despite inherent limitations at this step, the approach consists in creating an ensemble of specialized models adapted to the types of rotors studied, of reasonable shape, which permits an estimated knowledge of the most important problems. Certain methods used at Aerospatiale for the study and aeroelastic adjustment of tail rotors are described as well as their application to different concepts (articulated rotors, rotors made of composites, and "fenestrons". Transl. by A.R.H.

N84-11130# Politecnico di Milano (Italy). Dept. of Aerospace.
THE ROLE OF AEROELASTICITY IN THE PRELIMINARY DESIGN OF HELICOPTER ROTORS c05
V. Giavotto, M. Borri, A. Russo (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy), and A. Ceriotti (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 8 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

The design of a helicopter rotor is a complex process, in which aeroelastic aspects are involved practically at all stages. As the integration of the different models employed in the design needs to be rationalized, integrated computation system shall be developed, whereby aeroelasticity can be taken into account since the earliest stages. This paper shows the first significant results of a development activity of this kind carried out by AUGUSTA in cooperation with POLITECNICO of Milano. Author

N84-11131# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).
AEROELASTICITY AND OPTIMIZATION AT THE DESIGN STAGE [AEROELASTICITE ET OPTIMISATION EN AVANT-PROJET] c05
C. Petiau and D. Boutin *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 18 p refs In FRENCH (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

A procedure developed for static and dynamic structural analysis is completed in several weeks using a three view scheme of the aircraft, laws of the relative mass of wing units, a summary definition of the internal architecture, a choice of materials, and construction technology. For each version studied, calculation at the design stage involves: (1) a first finite element analysis of rough planning with sampling and simplified loads; (2) analysis of problems of static aeroelasticity, computation of loads by accounting for aeroelasticity, and the automatic study of surrounding loads; (3) computation of flutter with a study of critical configurations with exterior loads removed; and (4) the automatic optimization of sampling, supplying the minimal weight of the structure that satisfies the constraints of static behavior, of aerodistortion limitations, and of the speed of velocity of flutter. A combat aircraft with wings made composite materials is analyzed. A.R.H.

N84-11132# British Aerospace Aircraft Group, Preston (England).
AEROELASTIC CONSIDERATIONS IN PRELIMINARY DESIGN OF A MILITARY COMBAT AIRCRAFT c05
M. Ormerod and D. G. Gibson *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

This report gives an outline of the aeroelastic considerations taken into account during the early stages of a modern combat aircraft design. It describes the manner in which the aerodynamic performance requirements are balanced against what can be achieved by structural optimization. At the same time, flutter characteristics are established in such a way that as many as possible of the design features that are potentially critical for flutter are identified. It is shown that these procedures can produce structure that achieves the selected performance targets and give adequate fundamental (bending/torsion) flutter speeds. However, there are significant secondary effects associated with items such as tip missiles, control surface actuation and underwing stores that have to be treated carefully if meaningful design advice is to be given before the design is frozen. Author

N84-11133# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Airplane Div.
PRELIMINARY DESIGN OF AIRCRAFT USING STRUCTURAL OPTIMIZATION METHODS c05
H. Goedel, G. Schneider, and H. Hoernlein *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 13 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

Weight minimized surfaces of a modern high performance aircraft have to fulfill statical, dynamical and aeroelastical requirements such as highly maneuverable aircraft, high control surface effectiveness, no flutter in the mission domain. To meet these requirements it is necessary to improve the optimization procedures and applicate them even in the preliminary design phase of an aircraft to become acquainted with the influence of the main design parameters. The presented paper deals with the activities at MBB in the field of structural optimization. The presented paper deals with the activities at MBB in the field of structural optimization. The theoretical background of the optimization will be described with special regard to the constraints such as stresses, deflections in conjunction with control surface effectivenesses, flutter speed and side limits. Flutter speed optimization is based on an optimality criterion including physical facts whereas for the other constraints mathematical programming procedures are used. By means of well known test examples, a vertical tail structure and a simplified wing structure the capabilities of the applied optimization program systems are shown and results are presented. Author

N84-11134# Rockwell International Corp., El Segundo, Calif.
A FLUTTER OPTIMIZATION PROGRAM FOR COMPLETE AIRCRAFT STRUCTURAL DESIGN c08
Sidney Siegel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

A new computer program for flutter optimization has been developed and successfully used to accurately account for the interactive aerodynamic and structural effects of the complete aircraft. The program is both cost and time effective when compared with alternate available approaches and can be used from preliminary through advanced design stages. To insure that strength requirements are met, the optimization program starts with the strength design and automatically performs an iterative solution to raise the complete aircraft flutter speed. During each cycle of iteration, local areas of structure are stiffened by applying the criterion of constant strain energy density in the flutter mode to obtain near minimum weight solution. This program has successfully analyzed recent complete aircraft designs to provide adequate structure for flutter safety. Author

N84-11135# Politecnico di Milano (Italy). Ist. di Ingegneria Aerospaziale.
FAST FLUTTER CLEARANCE BY PARAMETER VARIATION c08
V. Giavotto, P. Mantegazza, T. Merlini, L. DeOtto (Aermacchi, Varese, Italy), M. Lucchesini (Aermacchi, Varese, Italy), and R.

Mantelli (Aermacchi, Varese, Italy) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

After a discussion regarding the main requirements of the study of flutter in the preliminary design, a unified computation system is proposed, which can effectively perform the various types of analysis required. This system was implemented and confirmed through the comparison with experimental results obtained with a wind tunnel model. The computation system used for the flutter analysis of a combat aircraft with external stores proved to be effective and adequately accurate even in the hardest situations, when the gradients of the critical speed with respect to design parameters are very high. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N84-11136* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FAMILY OF AIRFOIL SHAPES FOR ROTATING BLADES Patent
Kevin W. Noonan, inventor (to NASA) 1 Nov. 1983 9 p Filed 25 Jun. 1982 Supersedes N82-33372 (20 - 24, p 3389)
(NASA-Case-LAR-12843-1; US-Patent-4,412,664; US-Patent-Appl-SN-392096; US-Patent-Class-244-35R; US-Patent-Class-244-35A; US-Patent-Class-416-223R; US-Patent-Class-416-242) Avail: US Patent and Trademark Office CSCL 01A

An airfoil which has particular application to the blade or blades of rotor aircraft such as helicopters and aircraft propellers is described. The airfoil thickness distribution and camber are shaped to maintain a near zero pitching moment coefficient over a wide range of lift coefficients and provide a zero pitching moment coefficient at section Mach numbers near 0.80 and to increase the drag divergence Mach number resulting in superior aircraft performance.
Official Gazette of the U.S. Patent and Trademark Office

N84-11137 Iowa State Univ. of Science and Technology, Ames.
A GENERALIZED SOLUTION TECHNIQUE FOR THE PARABOLIZED NAVIER-STOKES EQUATIONS Ph.D. Thesis
Ethiraj Venkatpathy 1982 102 p
Avail: Univ. Microfilms Order No. DA8307796

A general parabolized Navier-Stokes equation solver is developed and the supersonic viscous flow around a flat slab delta wing and the flow around the Space Shuttle Orbiter are solved. The generalized marching scheme requires initial data which are obtained by computing the flow in the blunt nose region. This region is computed for the two problems using an axisymmetric or three dimensional unsteady Navier-Stokes solver. The use of a generalized transformation reduces the computational region required for the three dimensional blunt nose region and this effectively reduces the computational time required to solve the flow around the blunt nose region. An algebraic grid clustering scheme, which has a potential to be developed into a grid generation scheme, clusters the grid points around the wing tip and wing body juncture regions and describes the Space Shuttle Orbiter body shape accurately. A simple solution surface generation scheme, outlined here, allows the user to march the solution along the most appropriate direction. Dissert. Abstr.

N84-11138 Cincinnati Univ., Ohio.
A CONFORMAL MAPPING TECHNIQUE FOR NONSYMMETRIC POTENTIAL FLOWS WITH SEPARATION Ph.D. Thesis
Philip Jerome Heink 1982 129 p refs
Avail: Univ. Microfilms Order No. DA8307512

A technique is described for efficiently solving for the potential flow past an arbitrary body with separation. The solution involves a conformal mapping usng the Schwartz-Christoffel transformation generalized for curved elements. Solutions and an airfoil with a soiler. The technique is also adapted for use in solving for the flow past a parabola with separation on one side. For this case, there is a study of smooth separation. While the technique is shown to be second-order accurate, there is also a discussion of the nature of the signularities in the transformation which the implementation of higher order methods. Dissert. Abstr.

N84-11139 Mississippi State Univ., State College.
THE USE OF AN ADAPTIVE GRID IN A SOLUTION OF THE NAVIER-STOKES EQUATIONS FOR INCOMPRESSIBLE FLOW Ph.D. Thesis
L. Michael Freeman 1982 76 p
Avail: Univ. Microfilms Order No. DA8307452

An adaptive-grid algorithm is used for the computational solution of the incompressible two-dimensional Navier-Stokes equations. The governing equations are written in the non-conservative, primitive-variables formulation. In each time step the Navier-Stokes equations are solved by a point SOR method and a new grid is generated for use in the next time step. The basic coordinate generation method used in this study is that of Thompson, et al for arbitrary, curvilinear coordinates in two dimensions. The adaptive-grid algorithm calculates flow field gradients and modifies the coordinate line attraction parameters based on the magnitude of the gradients. Grid point speeds are calculated based on grid point location history. The Navier-Stokes system of governing equations consists of two momentum equations and a Poisson pressure equation for advancing the pressure in time. The pressure equation is obtained by taking the divergence of the momentum equations. Dissert. Abstr.

N84-11140 Wichita State Univ., Kans.
LOW ASPECT RATIO WING/BODY VORTEX INTERACTION AT LARGE ANGLES OF PITCH AND YAW Ph.D. Thesis
David Manor 1983 148 p
Avail: Univ. Microfilms Order No. DA8308660

The effects of large angles of pitch and yaw on the performance and stability of double-delta wing, cylindrical body, and wing/body configurations were determined experimentally using six-component force measurements, surface oil flow and wake total pressure surveys. The force measurements results are presented in graphical form, and flow-field photographs of the wake and surface oil flow are also included. The wake total pressure information reveals details of the vortex structure not available with other methods. This information includes size, location, shape, and total pressure coefficient. Sideslip angle resulted in a decreased stall angle of attack lower C sub LMAX, enhancement of post-stall lift recovery, and increased upwind vortex sheet size and decreased downwind vortex size. As angle of attack increased, vortex merging caused a reduction in sideforce. Adding the body to the wing increased the levels of adverse rolling and yawing moments at the stall. Dissert. Abstr.

N84-11141*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REYNOLDS NUMBER TESTS OF AN NPL 9510 AIRFOIL IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
Renaldo V. Jenkins Nov. 1983 87 p refs
(NASA-TM-85663; L-15585; NAS 1.15:85663) Avail: NTIS HC A05/MF A01 CSCL 01A

An investigation of the NPL 9510 airfoil was conducted in the Langley 0.3-Meter Transonic Cryogenic Tunnel over the following ranges of test conditions: Mach number of 0.35 to 0.82, total temperature of 94 K to 300 K, total pressure of 1.20 to 5.81 atm, Reynolds number based on airfoil chord of 1.34 x 10 to the 6th power to 48.23 x 10 to the 6th power, and angle of attack of 0 deg to 6 deg. The drag creep previously reported by the British National Physics Laboratory at low Reynolds numbers was also found to be present at high Reynolds numbers; the section drag

coefficient continued to decrease even at the highest Reynolds number tested. Tests made close to free-stream saturation did not produce altered aerodynamic coefficients due to condensation effects. Author

N84-11142*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIRLOADS ON BLUFF BODIES, WITH APPLICATION TO THE ROTOR-INDUCED DOWNLOADS ON TILT-ROTOR AIRCRAFT
W. J. McCroskey, Ph. Spalart, G. H. Laub, M. D. Maisel, and B. Maskew (Analytical Methods, Inc., Bellevue, Wash.) Sep. 1983 15 p refs Presented at the 9th European Rotorcraft Forum, Stresa, Italy, 13-15 Sep. 1983 Prepared in cooperation with Army Research and Technology Labs., Moffett Field, Calif.
(NASA-TM-84401; A-9474; NAS 1.15:84401; AVRADCOM-TR-83-A-12) Avail: NTIS HC A02/MF A01 CSCL 01A

The aerodynamic characteristics of airfoils with several flap configurations were studied theoretically and experimentally in environments that simulate a wing immersed in the downwash of a hovering rotor. Special techniques were developed for correcting and validating the wind tunnel data for large blockage effects, and the test results were used to evaluate two modern blockage effects, and the test results were used to evaluate two modern computational aerodynamics codes. The combined computed and measured results show that improved flap and leading-edge configurations can be designed which will achieve large reductions in the downloads of tilt-rotor aircraft, and thereby improve their hover efficiency. Author

N84-11143*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ROTOR/BODY AERODYNAMIC INTERACTIONS
Mark D. Betzina, Charles A. Smith, and Patrick Shinoda Oct. 1983 39 p refs
(NASA-TM-85844; A-9500; NAS 1.15:85844; USAAVRADCOM-TR-83-A-12) Avail: NTIS HC A03/MF A01 CSCL 01A

A wind tunnel investigation was conducted in which independent, steady state aerodynamic forces and moments were measured on a 2.24 m diam. two bladed helicopter rotor and on several different bodies. The mutual interaction effects for variations in velocity, thrust, tip-path-plane angle of attack, body angle of attack, rotor/body position, and body geometry were determined. The results show that the body longitudinal aerodynamic characteristics are significantly affected by the presence of a rotor and hub, and that the hub interference may be a major part of such interaction. The effects of the body on the rotor performance are presented. J.M.S.

N84-11144*# Lockheed-California Co., Burbank.
EFFECTS OF NACELLE CONFIGURATION/POSITION ON PERFORMANCE OF SUBSONIC TRANSPORT Final Report
L. H. Bangert, D. K. Krivec, and R. N. Segall Washington NASA Nov. 1983 193 p refs
(Contract NAS1-16644)
(NASA-CR-3743; NAS 1.26:3743; LR-30436) Avail: NTIS HC A09/MF A01 CSCL 01A

An experimental study was conducted to explore possible reductions in installed propulsion system drag due to underwing aft nacelle locations. Both circular (C) and D inlet cross section nacelles were tested. The primary objectives were: to determine the relative installed drag of the C and D nacelle installations; and, to compare the drag of each aft nacelle installation with that of a conventional underwing forward, drag of each aft nacelle installation with that of a conventional underwing forward, pylon mounted (UTW) nacelle installation. The tests were performed in the NASA-Langley Research Center 16-Foot Transonic Wind Tunnel at Mach numbers from 0.70 to 0.85, airplane angles of attack from -2.5 to 4.1 degrees, and Reynolds numbers per foot from 3.4 to 4.0 million. The nacelles were installed on the NASA USB full span transonic transport model with horizontal tail on. The D nacelle installation had the smallest drag of those tested. The UTW nacelle installation had the largest drag, at 6.8 percent larger than the D at Mach number 0.80 and lift coefficient (C sub L) 0.45. Each tested configuration still had some interference drag, however. The effect of the aft nacelles on airplane lift was to increase C sub L at a fixed angle of attack relative to the wing body. There was higher lift on the inboard wing sections because of higher pressures on the wing lower surface. The effects of the UTW installation on lift were opposite to those of the aft nacelles. Author

N84-11145*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPUTER PROGRAM FOR ESTIMATING THE AERODYNAMIC CHARACTERISTICS OF NACA 16-SERIES AIRFOILS
Catherine M. Maksymiuk and Sally A. Watson Sep. 1983 118 p
(NASA-TM-85696; NAS 1.15:85696) Avail: NTIS HC A06/MF A01 CSCL 01A

A computer program written in a table "look-up" format, is presented which provides a comprehensive data base on NACA 16-series airfoils. The geometry covered is limited to cambers for a design-lift coefficient from 0.0 to 0.7 and thickness ratios from 4 to 21%. The data include Mach numbers from 0.3 to 1.6, angles of attack from -4 to 8 degrees, and lift coefficients from 0.0 to 0.8. Extrapolation is used to obtain data from Mach numbers, angles of attack, and lift coefficients beyond those for which data are available. A routine to adjust the lift and drag coefficients beyond stall is included. The uses and limitations of the program are also discussed. A.R.H.

N84-11146# United Research Corp., Santa Monica, Calif.
NONPERIODIC FLUCTUATIONS INDUCED BY STATIONARY SURFACE WAVINESS ON A SEMI-INFINITE PLATE Final Report
Harold L. Rogler and Chih-Tsai Chen Arnold AFS, Tenn. AEDC Jul. 1983 43 p refs
(Contract F40600-79-C-0002)
(AD-A130820; AEDC-TR-83-10) Avail: NTIS HC A03/MF A01 CSCL 20/4

An analytical/numerical study of flow over an aerodynamic model or vehicle with surface waviness illustrates how surface waviness can generate several families of waves. The classical Kelvin-Hemholtz solution for irrotational flow over a wavy wall is extended to include the effects of the leading edge of a semi-infinite plate. The solution, obtained by conformal mapping and integral transforms, shows that a monochromatic surface waviness can generate a spectrum of standing waves with a continuum of x-wavenumbers, as well as the Kelvin-Helmholtz solution. Downstream of the leading edge, each of those standing waves decays exponentially in the streamwise direction and oscillates sinusoidally in the direction normal to the plate. These standings waves satisfy the usual boundary conditions on a flat plate, although they are initiated by the combined effects of the waviness of the wall and the leading edge. The spectrum depends upon the phase of the surface waviness with respect to the leading edge. Far downstream of the leading edge, only the Kelvin-Helmholtz solution remains. Upstream of the leading edge, the flow field can be represented as a superposition of exponentially-growing standing waves. The theory for flow over a stationary wavy wall is applicable to the case of flow over a traveling wavy wall if the velocity is properly nondimensionalized and the phase of the surface waviness is replaced by the product by frequency and time. Author (GRA)

N84-11147# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOLUTION OF A MINIMUM PROBLEM IN AIRCRAFT WING THEORY
Karl Nickel 19 Jul. 1983 14 p Transl. into ENGLISH from Z. Angew. Math. Mech. (East Germany), v. 31, no. 3, Mar. 1951 p 72-77
(AD-A131070; FTD-ID(RS)T-0820-83) Avail: NTIS HC A02/MF A01 CSCL 20/4

The third fundamental problem of Prandtl's theory of the

supporting line is extended to the case of a finite number of linear supplementary conditions, and solved. Three examples demonstrate cases which occur in practice, with such supplementary conditions. Author

N84-11148# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
MACH REFLECTION FLOW FIELDS ASSOCIATED WITH STRONG SHOCKS
Harold Mirels 25 Jul. 1983 67 p refs
(Contract F04701-82-C-0083)
(AD-A131384; TR-0083(3785)-1; SD-TR-83-50) Avail: NTIS HC A04/MF A01 CSCL 20/4

The Mach reflection associated with the passage of a shock wave over a wedge is treated in the limit of an ideal gas and a strong shock. In this limit, flow properties are functions only of wedge angle theta and the ratio of specific heats gamma. Numerical results are presented for gamma = 9/7, 7/5, and 5/3. Wedge angles are noted at which the transition from regular to double-Mach, to complex-Mach, and to simple-Mach reflection occurs. Characteristic velocities in the recirculation region associated with Mach reflection are estimated. Local surface pressure maxima, at the upstream and downstream edge of the recirculation region, are also estimated. The scale of the recirculation region increases with decrease in gamma, in accord with experimental observations. The wedge solution is used on a piecewise basis to estimate height-of-burst (HOB) flow fields. Normalized results are presented for HOB triple-point trajectory and surface pressure variation with range. The present results provide a convenient characterization of Mach reflection flow fields associated with both wedge and HOB flows. Validation of the HOB solution, however, is needed. GRA

N84-11149# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
WIND TUNNEL WALL INTERFERENCE Final Report, 1 Apr. 1977 - 31 Mar. 1982
D. B. Bliss Apr. 1983 20 p refs
(Grant AF-AFOSR-3337-77; AF Proj. 2307)
(AD-A131396; AFOSR-83-0655TR) Avail: NTIS HC A02/MF A01 CSCL 20/4

The aerodynamic behavior of an isolated finite length slender slot in a wind tunnel wall was analyzed. Numerical and analytical solutions were obtained relating the pressure differential to the average flow rate through the slot as a function of slot geometry for subsonic and supersonic flow. These solutions apply to the cases of linear and quadratic behavior corresponding to small and large slot flow rates. The analysis was extended to include the effect of an imposed pressure gradient along was extended to include the effect of an imposed pressure gradient along the slot. The results obtained are applicable to low aspect ratio holes as well as slots, and thus provide insight into the behavior of both slotted and perforated walls. The pressure gradient effect on holes was found to introduce a pressure tunnel walls. The effect of aerodynamic interference between holes in a perforated wall was studied for two- and three-dimensional configuration using a wavy wall model problem. It was found that the interference effect between wall elements is relatively local over a wide range of parameters, thereby allowing it to be represented by an additional term in the average wall boundary condition. The interference effect takes the form of a streamline curvature term. The concept of a compliant wall wind tunnel was explored by analysis of a model problem to demonstrate a particular flexible wall concept. In the area of adaptive wall winds tunnels, a method was developed which shows how control adjustments should be made to converge very rapidly to interference-free conditions. GRA

N84-11150# ARO, Inc., Arnold Air Force Station, Tenn.
A STEADY-STATE THERMAL MODEL FOR ANALYSIS OF INCIPIENT ICING ON AN AIR FOIL LEADING EDGE Final Report, Jan. 1981 - Sep. 1982
J. L. Fergus, Jr. AEDC Jul. 1983 57 p refs
(AD-A131207; AEDC-TR-83-2) Avail: NTIS HC A04/MF A01 CSCL 08/12

A steady-state thermal model was developed for analysis of incipient icing on the leading edge of wings, fins, or inlets of small missiles or drones at subsonic flight conditions. The model was found to be helpful in predicting the effects of liquid water content on the leading-edge surface temperature and on the free-stream static temperature in interpreting incipient icing test results. Model description, model validation, model behavior, and examples of model applications are presented. Author (GRA)

N84-11151# National Aerospace Lab., Amsterdam (Netherlands). Vlietuigen Hoofafdeling.
EXPERIMENTAL VORTEX ANALYZER
J. M. vanderLaan 21 Jan. 1982 8 p refs In DUTCH; ENGLISH summary Presented at Ned. Elektron.- en Radiogenootschap, 12 Nov. 1981
(NLR-MP-82006-U) Avail: NTIS HC A02/MF A01

A measuring system for detection and analyses of aircraft wake vortices in the approach zone of a runway was developed. It consists of propeller anemometers, a data acquisition unit, a quick look monitor, and a Nova minicomputer with a real time vortex detection program. Wake vortices are also described. The analyzer gives a good insight into wake vortices behavior in the domain close to the runway. Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N84-11152*# Control Data Corp., Minneapolis, Minn.
TEMPERATURE HISTORIES OF COMMERCIAL FLIGHTS AT SEVERE CONDITIONS FROM GASP DATA Final Report
W. H. Jasperson and G. D. Nastrom Oct. 1983 64 p refs
(Contract NAS3-21249)
(NASA-CR-168247; NAS 1.26:168247) Avail: NTIS HC A04/MF A01 CSCL 01C

The thermal environment of commercial aircraft from a data set gathered during the Global Atmospheric Sampling Program (GASP) is studied. The data set covers a four-year period of measurements. The report presents plots of airplane location and speed and atmospheric temperature as functions of elapsed time for 35 extreme-condition flights, selected by minimum values of several temperature parameters. One of these parameters, the severity factor, is an approximation of the in-flight wing-tank temperature. Representative low-severity-factor flight histories may be useful for actual temperature-profile inputs to design and research studies. Comparison of the GASP atmospheric temperatures to interpolated temperatures from National Meteorological Center and Global Weather Central analysis fields shows that the analysis temperatures are slightly biased toward warmer than actual temperatures, particularly over oceans and at extreme conditions. Author

N84-11153# Boeing Military Airplane Development, Seattle, Wash.
PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 1. SECTION 1 - 7 Final Report, May 1978 - Aug. 1980
John M. Schuler and Mark A. Dahl Wright-Patterson AFB, Ohio AFWAL Apr. 1982 232 p refs 3 Vol.
(Contract F33615-78-C-3603; AF Proj. 2403)
(AD-A131414; AFWAL-TR-82-3014-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 01/2

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency

response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. Author (GRA)

N84-11154# Boeing Military Airplane Development, Seattle, Wash.
PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 2. APPENDICES A - F Final Report, May 1978 - Aug. 1980
John A. Schuler and Mark A. Dahl Wright-Patterson AFB, Ohio AFWAL Apr. 1982 409 p refs 3 Vol.
(Contract F33615-78-C-3603; AF Proj. 2403)
(AD-A131415; AFWAL-TR-82-3014-Vol-2) Avail: NTIS HC A18/MF A01 CSCL 01/2

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. GRA

N84-11155# Boeing Military Airplane Development, Seattle, Wash.
PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 3. APPENDIX G. PILOT COMMENTS Final Report, May 1978 - Aug. 1980
John M. Schuler and Mark A. Dahl Wright-Patterson AFB, Ohio AFWAL Apr. 1982 123 p refs 3 Vol.
(Contract F33615-78-C-3603; AF Proj. 2403)
(AD-A131416; AFWAL-TR-82-3014-Vol-3) Avail: NTIS HC A06/MF A01 CSCL 01/2

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. GRA

N84-11100*# Ohio Univ., Athens. Center for Avionics Engineering.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT OHIO UNIVERSITY, 1982
Richard H. McFarland *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 3-6 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

N84-11104*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT MIT
Robert W. Simpson *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 75-80 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

N84-11108*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT PRINCETON UNIVERSITY
Robert F. Stengel *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 109-115 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01C

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N84-11156*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
FINDS: A FAULT INFERRING NONLINEAR DETECTION SYSTEM. USER'S GUIDE
R. E. Lancraft and A. K. Caglayan Hampton, Va. NASA. Langley Research Center Sep. 1983 105 p refs
(Contract NAS1-16579)
(NASA-CR-172199; NAS 1.26:172199; BBN-5358) Avail: NTIS HC A06/MF A01 CSCL 17G

The computer program FINDS is written in FORTRAN-77, and is intended for operation on a VAX 11-780 or 11-750 super minicomputer, using the VMS operating system. The program detects, isolates, and compensates for failures in navigation aid instruments and onboard flight control and navigation sensors of a Terminal Configured Vehicle aircraft in a Microwave Landing System environment. In addition, FINDS provides sensor fault tolerant estimates for the aircraft states which are then used by an automatic guidance and control system to land the aircraft along a prescribed path. FINDS monitors for failures by evaluating all sensor outputs simultaneously using the nonlinear analytic relationships between the various sensor outputs arising from the aircraft point mass equations of motion. Hence, FINDS is an integrated sensor failure detection and isolation system. S.L.

N84-11157*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT TEST RESULTS OF THE STRAPDOWN RING LASER GYRO TETRAD INERTIAL NAVIGATION SYSTEM
R. A. Carestia (Univ. of Southern Colorado, Pueblo), R. J. Hruby, and W. S. Bjorkman (Analytical Mechanics Associates, Mountain View, Calif.) Oct. 1983 74 p refs
(NASA-TM-84358; A-9315; NAS 1.15:84358) Avail: NTIS HC A04/MF A01 CSCL 17G

A helicopter flight test program undertaken to evaluate the performance of Tetrad (a strap down, laser gyro, inertial navigation system) is described. The results of 34 flights show a mean final navigational velocity error of 5.06 knots, with a standard deviation of 3.84 knots; a corresponding mean final position error of 2.66 n. mi., with a standard deviation of 1.48 n. mi.; and a modeled mean position error growth rate for the 34 tests of 1.96 knots, with a standard deviation of 1.09 knots. No laser gyro or accelerometer failures were detected during the flight tests. Off line parity residual studies used simulated failures with the prerecorded flight test and laboratory test data. The airborne Tetrad system's failure–detection logic, exercised during the tests, successfully demonstrated the detection of simulated "hard" failures and the system's ability to continue successfully to navigate by removing the simulated faulted sensor from the computations. Tetrad's four ring laser gyros provided reliable and accurate angular rate sensing during the 4 yr of the test program, and no sensor failures were detected during the evaluation of free inertial navigation performance. Author

N84-11158# Mitre Corp., McLean, Va.
PERFORMANCE OF THE COLLISION AVOIDANCE LOGIC DURING PRELIMINARY FLIGHT TESTS OF THE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS 3) Final Report
Lillian B. Zarrelli Washington FAA Mar. 1983 77 p refs
(Contract DTFA01-82-C-10003)
(MTR-82W238; FAA-PM-83-27) Avail: NTIS HC A05/MF A01

Flight tests of a prototype Traffic Alert and Collision Avoidance System (TCAS II) were conducted by the FAA Technical Center

between August and October 1981. One purpose of the flight tests was to verify the effectiveness of the TCAS logic in generating safe separation. Eighty-three planned encounters were flown during the test program. In addition, 14 low approaches, which resulted in the display of seven resolution advisories, were made into Washington National and Chicago O'Hare Airports. Three encounters of opportunity were also recorded. A total of 93 encounters were analyzed. The primary characteristics used to measure TCAS performance included the timeliness and correctness of the traffic and resolution advisories, and, where appropriate, the vertical separation provided by the system. The advisories generated during the flight tests were timely and were in the correct direction, based on the data at the time of sense selection. The vertical separation achieved at closest approach for each encounter was analyzed by a fast-time replay capability. With nine exceptions, this vertical separation was greater than or equal to the system threshold. In three of the exceptions, separation was reduced due to significant pilot delay in responding to the advisory; however the TCAS logic performed properly. Author

N84-11159# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INFLUENCE OF PHYSICAL AND AIR TRAFFIC CONDITIONS ON AIRCRAFT NOISE EMISSION TO THE GROUND Thesis [EINFLUSS DER PHYSIKALISCHEN UND FLUGBETRIEBLICHEN BEDINGUNGEN AUF DIE FLUGLAERMIMMISSION AM BODEN]
U. Issermann Oct. 1982 111 p refs In GERMAN
(MPIS-11/1982; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,65

The dependence of form and size of aircraft noise zones on the physical and air traffic conditions was investigated. The acoustic quantities required to determine the equivalent noise level are explained. A method to calculate the noise level curves is presented. The form of the noise spectrum has a strong effect on the damping of the waves in the atmosphere. The most important damping mechanisms are absorption in the air and additional damping in the neighborhood of the ground. The first mechanism is accurately taken into account by the method. Different models are used to take the second mechanism into account in the calculation. Observations show that the flight paths have considerable side scattering, resulting in a flight corridor several km broad. Author (ESA)

N84-11102*# Ohio Univ., Athens. Center for Avionics Engineering.
RF FRONT END INTERFACE AND AGC MODIFICATION
Stephen R. Yost *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 23-32 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

N84-11103*# Ohio Univ., Athens. Center for Avionics Engineering.
PRELIMINARY DESCRIPTION OF THE AREA NAVIGATION SOFTWARE FOR A MICROCOMPUTER-BASED LORAN-C RECEIVER
Fujiko Oguri *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 33-43 refs (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

N84-11107*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
RELATIVE-DATUM LORAN NAVIGATION
Antonio Elias *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 99-105 (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

N84-11109*# Princeton Univ., N. J. Lab. for Flight Research.
COCKPIT VOICE RECOGNITION PROGRAM AT PRINCETON UNIVERSITY
Chien Y. Huang *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 117-132 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 17G

N84-11110*# Princeton Univ., N. J. Lab. for Flight Research.
DISTRIBUTED PROCESSING AND FIBER OPTIC COMMUNICATIONS IN AIR DATA MEASUREMENTS
Kristin A. Farry and Robert F. Stengel *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 133-139 refs Previously announced as A83-11258 (For primary document see N84-11099 02-01)
(Contracts NGL-31-001-252; N00014-78-C-0257)
Avail: NTIS HC A07/MF A01 CSCL 17G

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-11160# Committee on Science and Technology (U. S. House).
JOINT SERVICES ADVANCED VERTICAL WING (JVX) PROGRAM
Washington GPO 1983 121 p Hearing before the Subcomm. on Transportation, Aviation and Mater. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 11, 2 May 1983
(GPO-22-771) Avail: Subcommittee on Transportation, Aviation and Materials

The advanced vertical lift program and tilt rotor research aircraft are reviewed. The technology of this aircraft is emphasized including what this airplane or helicopter or combination of the two can do and how it relates to both military and civilian needs. This program is an effort to develop and produce an aircraft which combines vertical lift capability with airplane cruise efficiency in order to satisfy the various mission requirements of the military services. The tilt rotor technology is being evaluated to determine if it is suitable for mission requirements identified by the military services. S.L.

N84-11161# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
QUIANG 5 ATTACK AIRCRAFT OF THE PRC
19 Jul. 1983 11 p Transl. into ENGLISH from Conmilit (China), Jan. 1983 p 36-39
(AD-A131058; FTD-ID(RS)T-0222-83) Avail: NTIS HC A02/MF A01 CSCL 01/3

The Qiang-5 aircraft design is analyzed. Its performance characteristics are discussed. S.L.

N84-11162# Bunker-Ramo Corp., Westlake Village, Calif. Electronic Systems Div.
SYMBOLOGY VERIFICATION STUDY Final Report, 1 Nov. 1978 - 30 May 1979
Carole Jean Kopala (AFWAL), John M. Reising (AFWAL), Gloria L. Calhoun, and Emmett L. Herron Wright-Patterson AFB, Ohio AFWAL Jan. 1983 123 p refs
(Contracts F33615-78-C-3614; F33615-81-C-3620; AF Proj. 2403) (AD-A131328; AFWAL-TR-82-3080) Avail: NTIS HC A06/MF A01 CSCL 01/3

The Department of Defense is currently working on a real-time combat situation display to be used in fighter aircraft cockpits. This study was performed to evaluate a proposed symbology set for real time combat situation displays in fighter aircraft. The primary objective was to compare pilot performance under two different coding conditions: shape coding only, and both color and shape coding. Color coding was found to significantly reduce overall average response time, with this effect becoming more pronounced with increasing symbol density. The second purpose of the study was to compare performance differences among the symbol types for each of the three states (friendly, unknown, or

hostile). Data on this topic is evaluated and possible explanations for discrepancies are noted. GRA

N84-11163# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
DEVELOPMENT AND FLIGHT TEST OF AN ACTIVE FLUTTER SUPPRESSION SYSTEM FOR THE F-4F WITH STORES. PART 2: GROUND TESTS AND SUBCRITICAL FLIGHT TESTS Final Report, Mar. 1978 - Mar. 1980
H. Hoenlinger, D. Mussman, R. Manser, and L. J. Huttsell Apr. 1983 156 p refs
(AF Proj. 2401)
(AD-A131402; AFWAL-TR-82-3040-Pt-2) Avail: NTIS HC A08/MF A01 CSCL 20/4

A flutter suppression system was developed and flight tested on an F-4F aircraft. The control law was designed using optimal control theory to minimize the control surface motion and to provide the required stability margins. During the test it was found that the dynamic behavior of the wing-pylon-store changed considerably with excitation amplitude due to free play and preload. The active flutter suppression system worked well and provided an increase in flutter speed. GRA

N84-11164# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
YC-15 EBF (EXTERNALLY-BLOWN FLAP) STOL (SHORT TAKEOFF AND LANDING) AIRPLANE FUSELAGE AND INTERIOR NOISE ENVIRONMENT Final Technical Report, Oct. 1981 - Feb. 1983
Vincent R. Miller May 1983 81 p refs
(AF Proj. 2401)
(AD-A131462; AFWAL-TM-83-170-FIBE) Avail: NTIS HC A05/MF A01

The purpose of this effort was to investigate the exterior fuselage and interior noise of the USAF/McDonnell-Douglas YC-15 Advanced Medium-Range Short-Takeoff- and Landing Transport airplane. This aircraft employs an under-the-wing, externally-blown-flap powered lift system designed to create augmented lift, which creates an intense acoustic environment. The blowing of the flap produces higher noise levels at lower frequencies than does the jet alone, increasing the acoustic environment of the fuselage and inside the cabin. A combination of exterior flush-mounted microphones, accelerometers, interior centerline and sidewall microphones were used during this investigation. Test conditions analyzed included takeoff, cruise, landing, taxi, and ground static over the full range of operating conditions. The effects of different flight parameters are displayed in the form of the octave, one-third octave, and narrowband plots and are compared to the changes on the acoustic environment.
Author (GRA)

N84-11165# Air Force Academy, Colo.
LIMITED PERFORMANCE AND FLYING QUALITIES VALIDATION OF THE SGM 2-37 POWERED SAILPLANE
Kent R. Crenshaw and Douglas G. Picha Jun. 1983 113 p refs
(AD-A131445; USAFA-TN-83-9) Avail: NTIS HC A06/MF A01

A limited performance and flying qualities validation of thee SGM2-37 powered sailplane was conducted in order to verify contract requirements and to evaluate the overall capability of the aircraft to satisfy mission requirements. The SGM2-37 aircraft meets all contract requirements except for exceeding the maximum takeoff ground run of 1000 feet; the minimum sink rate 240 rate feet per minute, exceeding the approach glide slope of 7 to 1 and failing to achieve a wings level stall speed between 35 and 45 mph. Failure to meet these requirements was not objectionable and did not detract from the operational capability of the aircraft. Problems with cockpit control movement of the left seat airbrake handle and with the control stick were identified along with eratic and inaccurate fuel quanitity indicator displays. GRA

N84-11166# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MODEL TO INVESTIGATE LOSSES AND EXCHANGE RATIOS IN LARGE-SCALE AIR-TO-AIR ENGAGEMENTS M.S. Thesis
Roy J. Bogusch Mar. 1983 188 p refs
(AD-A131410; AFIT/GST/OS/83M-1) Avail: NTIS HC A09/MF A01

There is no available technology for studying the results of tactical air-to-air engagements involving more than 16 aircraft. A computer model based on a central European NATO-Warsaw Pact conventional conflict was built using FORTRAN 77 and the SLAM simulation language. This model allows engagements of 144 aircraft. Blue aircraft operating from CAP patterns defend against Red fighter-bombers escorted by Red fighters. Only two types of aircraft are modeled: the McDonnell-Douglas F-15 and the MIG-23/27. The model is empirically based and simulates the physical movement of the aircraft, radar and visual detection, and employment of radar and heat-seeking air-to-air missiles and aerial cannon. GRA

N84-11167# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).
MODIFICATION OF WING DESIGN TO INCREASE LIFT FOR FUTURE AIRBUS DERIVATIVES (NEW) Final Report, Jul. 1982
Bernd Ewald Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 69 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-83-005; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,50

Two methods to increase modern transport aircraft payloads, especially for Airbus A 300 B4, are reported. Tests with canard wings at the forward part of the fuselage prove to be aerodynamically successful, but application was postponed due to structural problems. Additional spanwise trailing edge camber, carefully tuned, results in 7.5% lift increase at cruising speed. This modification was introduced in the A 300-family and the wing for A 300-600 was defined. Minor modifications on the wing, a study with winglets and an investigation of the aerodynamics of over-the-wing nacelles resulted in clear improvements. Author (ESA)

N84-11117# Lockheed-California Co., Burbank. Advanced Flutter and Dynamics Methods.
PRELIMINARY AEROELASTIC DESIGN OF STRUCTURES (PADS) METHODS DEVELOPMENT AND APPLICATION
N. A. Radovcich *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 29 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11119# Boeing Military Airplane Development, Seattle, Wash.
AEROELASTIC TAILORING OF HIGH-ASPECT-RATIO COMPOSITE WINGS IN THE TRANSONIC REGIME
C. J. Borland and D. W. Gimmestad *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11120# British Aerospace Aircraft Group, Weybridge (England).
AEROELASTIC DESIGN OF CIVIL TRANSPORTS AT THE PROJECT STAGE
R. E. J. Brazier, A. E. Dudman, and B. W. Payne *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 11 p (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11126# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
AEROELASTIC DESIGN CONSIDERATIONS IN THE DEVELOPMENT OF HELICOPTERS
H. Strehlow and B. Enenkl *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 25 p refs (For

primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11128# Sikorsky Aircraft, Stratford, Conn.
AEROELASTIC CONSIDERATIONS IN THE DESIGN OF HIGH SPEED ROTORS
Wen-Liu Miao and Robert H. Blackwell *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 16 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11129# Societe Nationale Industrielle Aerospatiale, Marignane (France.)
ESTIMATED ANALYSIS OF THE AEROELASTIC BEHAVIOR OF TAIL ROTORS [ANALYSE PREVIONNELLE DU COMPORTEMENT AEROELASTIQUE DES ROTORS ARRIERE]
G. Genoux and G. Blachere *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 22 p refs In FRENCH (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11130# Politecnico di Milano (Italy). Dept. of Aerospace.
THE ROLE OF AEROELASTICITY IN THE PRELIMINARY DESIGN OF HELICOPTER ROTORS
V. Giavotto, M. Borri, A. Russo (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy), and A. Ceriotti (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 8 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11131# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).
AEROELASTICITY AND OPTIMIZATION AT THE DESIGN STAGE [AEROELASTICITE ET OPTIMISATION EN AVANT-PROJET]
C. Petiau and D. Boutin *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 18 p refs In FRENCH (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11132# British Aerospace Aircraft Group, Preston (England).
AEROELASTIC CONSIDERATIONS IN PRELIMINARY DESIGN OF A MILITARY COMBAT AIRCRAFT
M. Ormerod and D. G. Gibson *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11133# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Airplane Div.
PRELIMINARY DESIGN OF AIRCRAFT USING STRUCTURAL OPTIMIZATION METHODS
H. Goedel, G. Schneider, and H. Hoernlein *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 13 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N84-11168# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
COMPUTER GENERATED PICTORIAL STORES MANAGEMENT DISPLAYS FOR FIGHTER AIRCRAFT Final Report, 1 Aug. 1980 - 30 Sep. 1981
Anthony J. Aretz, John M. Reising, Carole Jean Kopala, Gloria L. Calhoun, and Emmett L. Herron May 1983 90 p refs (AF Proj. 2403)
(AD-A131412; AFWAL-TR-83-3016) Avail: NTIS HC A05/MF A01 CSCL 01/4

Four methods for presenting stores information on a cathode ray tube (CRT) were evaluated to determine which is best in terms of pilot performance: (1) alphanumeric format, (2) monochrome pictorial format, (3) color pictorial format, and (4) alphanumeric and color pictorial format. Results indicated that pilots performed equally well with the alphanumeric, color pictorial, and alphanumeric/color pictorial formats but that performance with the black and white pictorial format was significantly worse than all three of these formats. Subjective data indicated significant pilot preference for the alphanumeric/color pictorial format. These results indicate one potential advantage of color pictorial formats in the cockpit. Mainly, in addition to the specific information provided by the alphanumeric format, the color pictorial format provides a situational awareness where the pilot can obtain important information at a glance. GRA

N84-11169# VDO-Luftfahrtgeraete Werk Adolf Schindling G.m. b.H., Frankfurt (West Germany). Bereich Luftfahrt.
COMPUTER SYMBOL GENERATOR AND CONTROL PANEL FOR AN INTEGRATED COCKPIT COLOR DISPLAY INFORMATION SYSTEM Final Report, Jun. 1982
Hans Werner Fischer, Werner Klein, and Franz Magnien Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 158 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-83-007; ISSN-0170-1339) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,50

A cockpit color display system for airliners is presented. The system comprises a processor with an internal databus, a computer for data processing and a high speed strokewriting symbol generator. The latter works according to line-vector procedure which gives a high writing rate to control two displays. The control panel contains a twisted nematic liquid crystal alphanumeric display specially developed for this purpose. Due to its low reading angle, it is concluded that for serial construction a dichroic cell with sufficient contrast and lifetime is required.
Author (ESA)

N84-11101*# Ohio Univ., Athens. Center for Avionics Engineering.
ENHANCED CHARACTER SIZES FOR THE VDM-1 VIDEO DISPLAY BOARD
Stanley M. Novacki, III and James D. Nickum *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 9-22 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01D

N84-11105*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.
LATERAL RUNWAY APPROACH GUIDANCE USING LORAN-C
Robert W. Simpson *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 81-87 (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01D

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-11170*# General Electric Co., Evendale, Ohio. Aircraft Engine Business Group.

ENERGY EFFICIENT ENGINE: FLIGHT PROPULSION SYSTEM, PRELIMINARY ANALYSIS AND DESIGN UPDATE Topical Report, Nov. 1978 - Jul. 1982
E. M. Stearns Nov. 1982 61 p refs
(Contract NAS3-20643)
(NASA-CR-167980; NAS 1.26:167980; R82AEB532) Avail: NTIS HC A04/MF A01 CSCL 21E

The preliminary design of General Electric's Energy Efficient Engine (E3) was reported in detail in 1980. Since then, the design has been refined and the components have been rig-tested. The changes which have occurred in the engine and a reassessment of the economic payoff are presented in this report. All goals for efficiency, environmental considerations, and economic payoff are being met. The E3 Flight Propulsion System has 14.9% lower sfc than a CF6-50C. It provides a 7.1% reduction in direct operating cost for a short haul domestic transport and 14.5% reduction for an international long distance transport. Author

N84-11171*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F100 MULTIVARIABLE CONTROL SYNTHESIS PROGRAM. COMPUTER IMPLEMENTATION OF THE F100 MULTIVARIABLE CONTROL ALGORITHM
James F. Soeder Oct. 1983 46 p
(NASA-TP-2231; E-1496; NAS 1.60:2231) Avail: NTIS HC A03/MF A01 CSCL 21E

As turbofan engines become more complex, the development of controls necessitate the use of multivariable control techniques. A control developed for the F100-PW-100(3) turbofan engine by using linear quadratic regulator theory and other modern multivariable control synthesis techniques is described. The assembly language implementation of this control on an SEL 810B minicomputer is described. This implementation was then evaluated by using a real-time hybrid simulation of the engine. The control software was modified to run with a real engine. These modifications, in the form of sensor and actuator failure checks and control executive sequencing, are discussed. Finally recommendations for control software implementations are presented. S.L.

N84-11172# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF ENGINEERING THERMOPHYSICS (SELECTED ARTICLES)
20 May 1983 89 p refs Transl. into ENGLISH from Gongcheng Rewuli Xuebao (China), v. 2, no. 2, 1981 p 106-110, 121-144, 160-172 and 185-187
(AD-A129432; FTD-ID(RS)T-0377-83) Avail: NTIS HC A05/MF A01 CSCL 21/5

Optical cycle parameters of turbofan engines with equal total pressure mixing exhaust, transonic cascade flow field circulation, a twin shaft turbojet engine, a transonic compresses, multistage turbines, and axial flow compressors, thermal conductivity are discussed. N.W.

N84-11173# Mathematical Sciences Northwest, Inc., Bellevue, Wash.
INVESTIGATION OF WATER ROTOR TURBOFANS FOR CRUISE MISSILE ENGINES, VOLUME 2 Final Report
R. Taussig and P. Cassady Apr. 1983 51 p refs 2 Vol.
(Contract N00140-82-C-9729; DARPA Order 4361)
(AD-A131168; MSNW-13.213.01.70-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 21/5

The history of wave rotor applications to aircraft turbine engines is reviewed in order to determine the reasons for past successes and failures. The results show that two different kinds of wave rotors performed successfully in laboratory tests in the mid-1950s and late 1960s. These were the Pearson wave rotor/turbine built and tested by Ruston Hornsby in England and the Complex pressure exchange wave rotor built by the Brown-Boveri Company and tested by the Rolls-Royce Company. With the advent of advanced gasdynamic numerical simulation techniques embodied in an experimentally verified computer flow code for wave rotors, the prospect of upgrading these earlier wave rotor designs for a modern high temperature, high pressure aircraft turbofan engine looks very attractive. The flow code would allow very rapid design optimization and cut down the time and costs for successful engine development. A suitable niche for the initial application of wave rotor turbofans has appeared in the area of small, low-TSFC engines; wave rotors may also allow better cruise conditions for high performance engines. Author (GRA)

N84-11174# Mathematical Sciences Northwest, Inc., Bellevue, Wash.
INVESTIGATION OF WAVE ROTOR TURBOFANS FOR CRUISE MISSILE ENGINES, VOLUME 1 Final Report
R. Taussig, P. Cassady, J. Zumdieck, W. Thayer, E. Klosterman, R. Milroy, and R. Klug Apr. 1983 135 p 2 Vol.
(Contract N00140-82-C-9729; DARPA Order-4361)
(AD-A131167; MSNW-13.213.01.70-VOL-1) Avail: NTIS HC A07/MF A01 CSCL 21/5

Wave rotors have been investigated as a technology for improving the performance of small turbofan engines in the 600 to 1000 lb. thrust class. This report summarizes the results of an eight-month study to analyze wave rotor performance for different configurations and to determine its sensitivity to operating and design parameters. Engine cycle calculations were also performed in order to estimate engine performance improvements and sensitivity to the wave rotor component. Wave rotor/turbines and pressure exchanger wave rotors both have been evaluated. In each case, experimental data exists which confirms predicted wave rotor performance over a wide range of operating conditions. GRA

N84-11175# Rocket Research Corp., Redmond, Wash.
HYDRAZINE APU STARTER DEVELOPMENT Final Report, Mar. 1978 - Mar. 1983
D. A. Pahl Wright-Patterson AFB, Ohio AFWAL Jun. 1983 169 p refs
(Contract F33615-78-C-2003; AF Proj. 3145)
(AD-A131575; AFWAL-TR-83-2039; RRC-83-4-905) Avail: NTIS HC A08/MF A01

The purpose of this program was to develop a hot gas vane motor that would have application to advanced aircraft APU starting. Over the course of the program, the motor design evolved to the point that -65 degrees F starts, hot restarts above 130 degrees F, and multiple starts without refurbishment were possible. Analytical studies evaluated concepts for reducing motor internal friction. Author (GRA)

N84-11123# De Havilland Aircraft Co. of Canada Ltd., Downsview (Ontario).
AEROELASTIC DESIGN CONSIDERATIONS FOR TURBOPROP POWERPLANT INSTALLATIONS
John J. Glaser *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 18 p refs Sponsored in part by Dept. of National Defence and National Research Council of Canada (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N84-11176*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION AND EVALUATION OF THE SH-2F HELICOPTER IN A SHIPBOARD ENVIRONMENT USING THE INTERCHANGEABLE CAB SYSTEM
Clyde H. Paulk, Jr., David L. Astill, and Shawn T. Donley (NADC, Warminster, Pa.) Aug. 1983 87 p refs

(NASA-TM-84387; A-9435; NAS 1.15:84387) Avail: NTIS HC A05/MF A01 CSCL 01C

The operation of the SH-2F helicopter from the decks of small ships in adverse weather was simulated using a large amplitude vertical motion simulator, a wide angle computer generated imagery visual system, and an interchangeable cab (ICAB). The simulation facility, the mathematical programs, and the validation method used to ensure simulation fidelity are described. The results show the simulator to be a useful tool in simulating the ship-landing problem. Characteristics of the ICAB system and ways in which the simulation can be improved are presented. S.L.

N84-11177*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ADAPTIVE INVERSE CONTROL FOR HELICOPTER VIBRATION REDUCTION

Stephen A. Jacklin Sep. 1983 19 p refs (NASA-TM-84336; NAS 1.15:84336) Avail: NTIS HC A02/MF A01 CSCL 01C

The reduction or alleviation of helicopter vibration will reduce maintenance requirements while at the same time increase ride quality and helicopter reliability. In forward flight, the helicopter's fuselage vibration spectrum tends to be dominated by multiples of the N/REV component. A way to use the method of adaptive inverse control to identify, in real-time, a controller capable of generating N/REV vibration of opposite phase to cancel the uncontrolled N/REV component is presented. Multicyclic feathering of blade pitch is the control considered. Author

N84-11178*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A FLIGHT-TEST EVALUATION OF A GO-AROUND CONTROL SYSTEM FOR A TWIN ENGINE POWERED-LIFT STOL AIRPLANE

DeLamar M. Watson and Gordon H. Hardy Oct. 1983 21 p refs (NASA-TM-84408; A-9482; NAS 1.15:84408) Avail: NTIS HC A02/MF A01 CSCL 01C

An automatic go-around control system was evaluated on the Augmentor Wing Jet Short Takeoff and Landing (STOL) Research Airplane (AWJSRA) as part of a study of an automatic landing system for a powered-lift STOL airplane. The results of the evaluation indicate that the go-around control system can successfully transition the airplane to a climb configuration from any initiation point during the glide-slope track or the flare maneuver prior to touchdown. Author

N84-11179# Air Force Academy, Colo.

AIRBORNE LABORATORY MEASUREMENT OF AIRCRAFT PERFORMANCE AND STABILITY AND CONTROL FOR LIGHT AIRCRAFT. SUPPLEMENT

Kent R. Crenshaw 24 Jun. 1983 173 p ref (AD-A131457; USAFA-TN-83-3-Suppl) Avail: NTIS HC A08/MF A01 CSCL 01/3

This report is a supplement to the article 'Integration of an Airborne Laboratory into the United States Air Force Academy Academic Curriculum' in USAFA-TR-83-2. It contains the test plans, flight test planning guides, and aircraft specifications handouts used during the applications phase of the Department of Aeronautics Airborne Laboratory. Sample calculations and plots from actual flight test data taken by cadets are also included. While at test plans, flight test planning guides, and aircraft specifications were designed to be used with the Beechcraft Sierra and Sundowner, the formats are sufficiently general so that they can be applied to any single-engine, general aviation aircraft. Commonly recognized flight test techniques are used for gathering data, and data reduction is accomplished using accepted procedures. Author (GRA)

N84-11180# Technische Univ., Munich (West Germany). Lehrstuhl fuer Flugmechanik und Flugregelung.

GUST ALLEVIATION Final Report [BOENABMINDERUNG]

Gerhard Bruening 1983 167 p refs In GERMAN (Contract DFG-Br-201/16) Avail: NTIS HC A08/MF A01

Gust alleviation concepts were studied numerically on a Boeing 707 aircraft with autopilot. Stochastic gust processes were studied in the frequency domain. The calculations show that the best solution is the control of the pitch position and the pitch velocity by using the autopilot mode pitch-hold. It is shown that additional control systems (e.g. transverse control) can substantially reduce disturbance. The influence of aircraft elasticity can only be assessed in a very simplified way. Deformations of airfoils and effects on stationary aerodynamics are determined. Author (ESA)

N84-11111*# Princeton Univ., N. J.

DATA ACQUISITION FOR STALL/SPIN FLIGHT RESEARCH

M. SriJayantha *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 141-156 (For primary document see N84-11099 02-01) Avail: NTIS HC A07/MF A01 CSCL 01C

N84-11118# Societe Nationale Industrielle Aerospatiale, Toulouse (France).

AEROSPATIAL'ES APPROACH TO THE STUDY OF FLUTTER AT THE DESIGN STAGE OF THE PROJECT [APPROCHE AEROSPATIALE DE L'ETUDE DU FLOTTEMENT AU NIVEAU DE L'AVANT-PROJET]

Michel Curbillon *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 32 p refs In FRENCH; ENGLISH summary (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11121# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.

TRANSONIC FLUTTER CLEARANCE FOR A SUPERCRITICAL TRANSPORT AIRCRAFT IN THE PRELIMINARY STAGE

N. Pronk, H. Walgemoed, and R. J. Zwaan (NLR, Amsterdam) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 13 p refs (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11122# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).

INFLUENCE OF MAIN DESIGN PARAMETERS ON FLUTTER BEHAVIOUR FOR AIRCRAFT CONFIGURATIONS WITH HEAVY CONCENTRATED MASSES

Helmut Zimmerman and Siegfried Vogel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 11 p ref (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11124# Douglas Aircraft Co., Inc., Long Beach, Calif.

THE DEVELOPMENT OF FAST-FLOW (A PROGRAM FOR FLUTTER OPTIMIZATION TO SATISFY MULTIPLE FLUTTER REQUIREMENTS)

Bruce A. Rommel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11125# Royal Aircraft Establishment, Farnborough (England).

THE INITIAL DESIGN OF ACTIVE CONTROL SYSTEMS FOR A FLEXIBLE AIRCRAFT

I. W. Kaynes and D. E. Fry *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11127# Westland Helicopters Ltd., Yeovil (England).

THE INFLUENCE OF AEROELASTIC STABILITY REQUIREMENTS ON HELICOPTER DESIGN

S. P. King *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01) Avail: NTIS HC A14/MF A01

N84-11134# Rockwell International Corp., El Segundo, Calif.
A FLUTTER OPTIMIZATION PROGRAM FOR COMPLETE AIRCRAFT STRUCTURAL DESIGN
Sidney Siegel *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 17 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

N84-11135# Politecnico di Milano (Italy). Ist. di Ingegneria Aerospaziale.
FAST FLUTTER CLEARANCE BY PARAMETER VARIATION
V. Giavotto, P. Mantegazza, T. Merlini, L. DeOtto (Aermacchi, Varese, Italy), M. Lucchesini (Aermacchi, Varese, Italy), and R. Mantelli (Aermacchi, Varese, Italy) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft Sep. 1983 12 p refs (For primary document see N84-11116 02-01)
Avail: NTIS HC A14/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N84-11181 Illinois Univ., Urbana.
OPTIMIZATION OF LONG RANGE MAJOR REHABILITATION OF AIRFIELD PAVEMENTS Ph.D. Thesis
David Henry Artman, Jr. 1983 170 p
Avail: Univ. Microfilms Order No. DA8309907

A methodology for managing pavement networks over prolonged analysis periods as developed. Separate independent methods were devised for project and network level analysis, and the project level procedures were designed to provide inputs into the network level procedures. The project level analysis procedures optimally select and schedule major rehabilitation activities (routine maintenance, reconstruction, and overlays) over an extended analysis period. A computer code was written to use dynamic programming methods to optimally select schedule the activities (routine maintenance, reconstruction, and overlays) over the analysis period (20 years), by maximizing the structural performance [area under the utility weighted Pavement Condition Index (PCI) versus time curve]. These results can be used by decision makers and pavement engineers to help decide which rehabilitation activities should be considered and when to schedule them.
Dissert. Abstr.

N84-11182# Federal Aviation Administration, Atlantic City, N.J.
EVALUTION OF RETROREFLECTIVE PAVEMENT MARKERS FOR PRECISION AND NONPRECISION RUNWAYS Final Report, Mar. 1981 - Dec. 1982
Guy S. Brown Sep. 1983 38 p refs
(FAA Proj. 081-502-520)
(FAA-CT-82-164) Avail: NTIS HC A03/MF A01

Retroreflective pavement markers installed to duplicate the patterns of runway centerline and touchdown zone lighting systems used for Catagory II runways were evaluated. The purpose was to (1) determine whether the markers could enhance nightime visual guidance and reduce minimums for Category I precision or nonprecision approaches and (2) determine if such guidance could provide increased safety of operations, particularly under wet runway conditions. Flight tests were conducted at two airports, one with a 150- by 6,144-foot runway and the other 100 by 2,950 feet. The shorter runway required a scaled down or abbreviated touchdown zone and color coded runway centerline. Visual contact height with the retroreflective pavement marker systems was not enhanced prior to reaching Minimum Descent Altitude (MDA) or Decision Height (DH) for nonprecision or Category I approaches, respectively; therefore, this system will not permit the reduction in approach minimums for Category I precision or nonprecision approaches. However, the test program demonstrated that, in the opinion of a widely diversified sample of user pilots, the system is effective in improving the safety of operation for final approach, flare, touchdown, landing, rollout, and for takeoffs. Author

N84-11183# Committee on Science and Technology (U. S. House).
TECHNOLOGY OF AIRPORT SAFETY
Washington GPO 1983 199 p Hearing before the Subcomm. on Transportation, Aviation and Mater. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 24, 18 Jul. 1983
(GPO-24-762) Avail: Subcommittee on Transportation, Aviation and Materials

The problems of airport safety are discussed with an emphasis on the use of technology to enhance the safety of airport systems. Specific criticisms of specific airports are examined in order to determine the adequacy of Government policy and research efforts. Other important matters such as the approach and departure procedures, the impact of noise abatement procedures on safety, aviation weather programs, terminal area guidance, airport design criteria, and fire and rescue capabilities are addressed. The technological needs and opportunities presented by short takeoff and landing aircraft and whether to use this technology to increase airport capacity are reviewed. S.L.

N84-11184# Illinois Univ., Urbana. Dept. of Civil Engineering.
RUBBER REMOVAL FROM POROUS FRICTION COURSE Final Report
Samuel H. Carpenter and Ernest J. Barenberg Washington FAA Sep. 1983 51 p refs
(Contract DTFA01-81-C-10085)
(FAA-PM-83-31) Avail: NTIS HC A04/MF A01

Rubber buildup on runways is a serious problem because it reduces friction on the runway. Where a porous friction course has been placed to improve frictional and drainage characteristics the problem of rubber buildup becomes even more serious because friction and water drainage both are lost. The occurrence of rubber buildup on porous friction courses and the methods used to remove the buildup are examined. Some innovative techniques were used to remove rubber from a PFC, however, most could not be evaluated because the surfaces had been replaced or resurfaced. Of all techniques, high pressure water blasting was felt to present the most promise for efficient rubber removal. Discussions with contractors pointed out the difficulties in planning and controlling the high pressure removal technique. A simple analysis was conducted to illustrate the effect variations in the operating parameters had on the work being done by the water. Careful control of these parameters will be required for their use on PFC surfaces where the potential for damage is high. Author

N84-11185# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany).
DETERMINATION OF THE PAVEMENT CLASSIFICATION NUMBER (PCN) OF AIRFIELDS [ERMITTLUNG DER PAVEMENT CLASSIFICATION NUMBER (PCN) VON FLUGBETRIEBSFLAECHEN]
Gerd-Dieter Schmidt Feb. 1983 84 p refs In GERMAN
(ISBN-3-87977-0530) Avail: NTIS HC A05/MF A01

Airfield PCN's were determined using the mathematical bearing strength model of the aircraft classification number PCN method. The equivalent limit load is calculated with simple mathematical and graphic methods. Flexible and rigid bearing systems (pavement structure, prepared subgrade, subgrade, California bearing ratio, modulus of soil reaction) are described. The lifetime of a bearing system depends on the static load cycle factor which is approximately calculated taking into account loading in the past and the future. The criteria to take dynamic additional loads into account are given. The PCN is determined for flexible and rigid coverings using a mathematical-analytical and a graphical method. Author (ESA)

N84-11106*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.

DEVELOPMENT OF REAL-TIME ATC SIMULATION FACILITY
John Pararas *In* NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. Oct. 1983 p 89-98 ref (For primary document see N84-11099 02-01)
Avail: NTIS HC A07/MF A01 CSCL 01E

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N84-11186*# Jet Propulsion Lab., Cape Canaveral, Fla.
TELECOMMUNICATIONS AND DATA ACQUISITION SYSTEMS SUPPORT FOR VOYAGER MISSIONS TO JUPITER AND SATURN, 1972-1981, PRELAUNCH THROUGH SATURN ENCOUNTER
M. R. Traxler and D. F. Beauchamp 1 Aug. 1983 167 p refs (NASA-CR-174571; NAS 1.26:174571; JPL-PUB-83-53) Avail: NTIS HC A08/MF A01 CSCL 22A

The Deep Space Network has supported the Voyager Project for approximately nine years, during which time implementation, testing, and operational support was provided. Four years of this time involved testing prior to launch; the final five years included network operations support and additional network implementation. Intensive and critical support intervals included launch and four planetary encounters. The telecommunications and data acquisition support for the Voyager Missions to Jupiter and Saturn are summarized. S.L.

N84-11187*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REPORT ON ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
Ronald G. Littlefield, ed. Aug. 1983 320 p
(NASA-TM-85455; NAS 1.15:85455; NSSDC/WDC-A-R/S-83-08) Avail: NTIS HC A14/MF A01 CSCL 22A

Information concerning active and planned spacecraft and experiments is included. The information covers a wide range of scientific disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and fundng of individual countries as well as cooperative arrangements among different countries. S.L.

N84-11188*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SATELLITE SERVICES SYSTEM ANALYSIS STUDY, PART 3 Final Report
Mar. 1982 78 p
(Contract NAS9-16121)
(NASA-CR-171718; NAS 1.26:171718; LMSC-D798873-A) Avail: NTIS HC A05/MF A01 CSCL 22A

The background, ground rules and assumptions, individual design reference mission results and total user benefit projection for the economic benefit analysis are discussed. Radiation protection, extravehicular activity (EVA) operational pressure, mobility effects, tool/glove/effects, anthropometric definition, EVA lighting, and equipment turnaround for the advanced extravehicular maneuvering unit are also discussed. N.W.

N84-11189*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SATELLITE SERVICES SYSTEM ANALYSIS STUDY: PROPELLANT TRANSFER SYSTEM Final Report
Aug. 1982 169 p
(Contract NAS9-16121)
(NASA-CR-174573; NAS 1.26:174573; D844900) Avail: NTIS HC A08/MF A01 CSCL 22A

General servicing requirements, a servicing mission concept and scenario, overall servicing needs, basic servicing equipment, and a general servicing mission configuration layout are addressed. Servicing needs, equipment concepts, system requirements equipment specifications, preliminary designs, and resource requirements for flight hardware for the propellant transfer system are also addressed. N.W.

N84-11190# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SUMMARY OF THE INAUGURAL MEETING OF THE CHINESE SOCIETY OF ASTRONAUTICS SPECIAL COMMITTEE FOR SOLID ROCKET PROPULSION AND ITS FIRST ACADEMIC CONFERENCE
29 Apr. 1983 6 p Transl. into ENGLISH from Yuhang Xuebao (China), no. 2, 1982 p 105
(AD-A129342; FTD-ID(RS)T-1578-82) Avail: NTIS HC A02/MF A01 CSCL 05/11

The Chinese Society of Astronautics (CSA) Special Committee for Solid Rocket Propulsion was established and its first academic conference held from 4 to 8 November 1981. Attending the conference were 87 delegates from 35 organizations of the CSA, affiliated institutions of higher learning, laboratories, plants, and stations of affiliated industrial organizations and scientific institutes. Eighteen of the delegates were members of this special committee. Author

N84-11191# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF THE CHINESE SOCIETY OF ASTRONAUTICS (SELECTED ARTICLES)
Yang Jiachi, Zhang Guofu, Sun Chenggi, Feng Xueyi, and Niu Yinsheng 1 Jul. 1983 85 p refs Transl. into ENGLISH from Yuhang Xuebac (China), no. 1, 1981 p 1-13, 23-30, 31-41 66-75, and 84-91
(AD-A131032; FTD-ID(RS)T-0373-83) Avail: NTIS HC A05/MF A01 CSCL 22/2

The three axis stabilized attitude control system used in recoverable technology testing satellites is discussed. Its composition function, and system parameters are discussed. Flight test results are discussed. R.J.F.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N84-11192*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ORBIT DETERMINATION AND PREDICTION STUDY FOR DYNAMIC EXPLORER 2
R. L. Smith (Computer Sciences Corp., Silver Spring, Md.), Y. Nakai (Computer Sciences Corp., Silver Spring, Md.), and C. E. Doll Oct. 1983 54 p refs
(NASA-TM-85098; NAS 1.15:85098) Avail: NTIS HC A04/MF A01 CSCL 22A

Definitive orbit determination accuracy and orbit prediction accuracy for the Dynamic Explorer-2 (DE-2) are studied using the trajectory determination system for the period within six weeks of spacecraft reentry. Baseline accuracies using standard orbit determination models and methods are established. A promising general technique for improving the orbit determination accuracy of high drag orbits, estimation of random drag variations at perigee passages, is investigated. This technique improved the fit to the tracking data by a factor of five and improved the solution overlap consistency by a factor of two during a period in which the spacecraft perigee altitude was below 200 kilometers. The results of the DE-2 orbit predictions showed that improvement in short term prediction accuracy reduces to the problem of predicting future drag scale factors: the smoothness of the solar 10.7 centimeter flux density suggests that this may be feasible. S.L.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N84-11193*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A GROUND TEST MEASUREMENT SYSTEM FOR THE SHUTTLE ENTRY AIR DATA SYSTEM
Paul C. Schutte Oct. 1983 29 p
(NASA-TM-85707; NAS 1.15:85707) Avail: NTIS HC A03/MF A01 CSCL 14B

The Ground Test Measurement System (GTMS) for determining vacuum decay leak rate within the orifice tubing assembly of SEADS is described. The system can also monitor the absolute pressure in the tubing assembly under certain conditions. The GTMS determines leak rate by measuring vacuum-pressure decay which can be converted into leakage flow rate. Results of performance testing and operation of the GTMS are given. Author

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N84-11194# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MISSION ANALYSIS: DEFINITION OF ORBITAL GEOMETRY OF ARTIFICIAL SATELLITES M.S. Thesis [ANALISE DE MISSOES: DEFINICAO DA GEOMETRIA ORBITAL DE SATELITES ARTIFICIAIS]
Valder Matos deMedeiros Aug. 1983 129 p refs In PORTUGUESE; ENGLISH summary
(INPE-2843-TDL/141) Avail: NTIS HC A06/MF A01

A classification of the application software for mission analysis is presented, giving emphasis to the modularity and flexibility of the routines for an easy access of the user. The orbits propagation methods are reviewed introducing a resort in the semianalytical propagation procedures, which amplifies the versatility of this method in mission analysis. The first satellite of the Complete Brazilian Space Mission (MECB) is taken as an example of application of this software and the described procedures. Author

N84-11195# RAND Corp., Santa Monica, Calif.
THE FLEXURAL BEHAVIOR OF PACSAT (PASSIVE COMMUNICATION SATELLITE) IN ORBIT Interim Report
William Sollfrey Feb. 1983 131 p refs
(Contract MDA903-82-C-0068; ARPA Order 3584-7)
(AD-A131406; RAND/R-2936-ARPA; LC-83-570;
ISBN-0-8330-0490-5) Avail: NTIS HC A07/MF A01 CSCL 22/2

This report presents an analysis of the libration and vibration of a passive communications satellite known as PACSAT. It addresses the effects of various disturbing mechanical forces on verticality and straightness. Phenomena considered include orbital ellipticity, earth oblateness, solar and lunar gravity, radiation pressure, micrometeorial impacts, and thermal bending effects. The last two are the most important. It is concluded that the flexural misbehavior of PACSAT in orbit is such that it is most improbable that the present design (unsupported linear array) can perform its communications functions. Author (GRA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N84-11196# RAND Corp., Santa Monica, Calif.
BOUNDING THE COSTS OF HEDGING AGAINST SPACE SHUTTLE CONTINGENCIES: A POLICY ANALYTIC APPROACH
I. S. Blumenthal Aug. 1983 49 p refs
(Contract F49620-82-C-0018)
(N1829-AF) Avail: NTIS HC A03/MF A01

The problem of how to determine acceptable guidelines (or a bound) for the costs of attempting to mitigate the effects that a space shuttle shutdown could have on the space-dependent component of national security capability is addressed. Questions considered include: (1) how to calculate replacement value (or cost) when the original procurement costs of most space capabilities are unavailable because of security classification of the data; (2) how to estimate the probability of total loss of a very new system; (3) how to use the previous two inputs to determine an annual premium rate; and (4) how to adapt the insurance premium calculation or obtain a reasonable bound of the costs of a hedge. A.R.H.

N84-11197*# Analytical Mechanics Associates, Inc., Hampton, Va.
STS-8 BET RESULTS
John T. Findlay, G. Mel Kelly, Michael L. Heck, and Judy G. McConnell Nov. 1983 173 p ref
(Contract NAS1-16087)
(NASA-CR-172257; NAS 1.26:172257; AMA-83-21) Avail: NTIS HC A08/MF A01 CSCL 22A

The final Best Estimate Trajectory (BET) products, i.e., the reconstructed trajectory, the Extended BET, AEROBET and MMLE input files, generated for the eighth NASA Space Shuttle flight are documented. The reconstructed trajectory (inertial BET) for this Challenger flight, the first night landing is discussed. State (position, velocity, and attitude) plus three accelerometer scale factors were determined from fitting the Guam S-band data, seven C-band passes, and pseudo Doppler and altimeter during rollout on Runway 22. The anchor epoch utilized for the batch weighted-least-squares determination was Sept. 5, 1983 7h1m50s.0 (25-310 GMT seconds). The spacecraft altitude at epoch is approx. 617 kft. IMU2 data were selected for the reconstruction. Author

N84-11198# Committee on Science and Technology (U. S. House).
FLIGHT OF STS-7 WITH ASTRONAUTS CAPTAIN ROBERT L. CRIPPEN, CAPTAIN FREDERICK H. HAUCK, COLONEL JOHN M. FABIAN, DOCTOR SALLY K. RIDE AND DOCTOR NORMAN E. THAGARD
Washington GPO 1983 25 p Hearing before the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 13, 19 Jul. 1983
(GPO-23-872) Avail: Committee on Science and Technology

The seventh flight of the space shuttle is reported. The space adaptation syndrone and utilization of the remote manipulator system are discussed. An Anik satellite and the Palapa satellite were deployed. The SPAS satellite was also deployed to conduct proximity operations to understand the interactions between the shuttle and satellites nearby. S.L.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N84-11199 Columbia Univ., New York.
ACTUATOR PLACEMENT CONSIDERATIONS FOR THE CONTROL OF LARGE SPACE STRUCTURES Ph.D. Thesis
Robert E. Lindberg 1982 126 p refs
Avail: Univ. Microfilms Order No. DA8307603

The problem of actuator placement for the control of distributed parameter systems such as large flexible space structures is considered. Focus is placed first on the concept of the degree of controllability. The behavior of the degree of controllability and its approximation is considered via application to simple problems for which the exact value may be computed. The upper bound approximation is found to be particularly exact for harmonic systems and an acceptable approximation for lightly damped systems. A method is proposed for avoiding the unacceptable behavior of the approximation in the neighborhood of a problem containing repeated roots. The divergence of the upper bound approximation in the problem of a double integral plant motivates the development of a new lower bound approximation based on discretization of the continuous time system. Dissert. Abstr.

N84-11200 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
SPACECRAFT THERMAL CONTROL SELECTION FOR SEVEN YEARS OF LIFETIME IN SYNCHRONOUS ORBIT
L. Preuss 1982 16 p Presented at 55th AGARD/SMP Panel Meeting/Specialists Meeting on Environ. Effects on Mater. for Space Appl., Toronto, 19-24 Sep. 1982
(MBB-UR-584-82-Oe) Avail: Issuing Activity

Nonconductive and conductive flexible second surface mirrors (SSM) with interference filters on top for satellite use are presented. The SSM composition is analyzed and defined. The optimization procedure for the SSM is outlined. The qualification of the SSM on laboratory scale for synchronous orbit is demonstrated. Handling, application and performance specifications are given.
Author (ESA)

N84-11201# Air Force Geophysics Lab., Hanscom AFB, Mass.
SCATHA (SPACECRAFT CHARGING AT HIGH ALTITUDES) ENVIRONMENTAL ATLAS Final Scientific Report
E. G. Mullen and M. S. Gussenhoven 3 Jan. 1983 171 p refs (AF Proj. 7601)
(AD-A131456; AFGL-TR-83-0002; AFGL-ERP-819) Avail: NTIS HC A08/MF A01

A study of the plasma environment encountered by the P78-2 Spacecraft Charging At High Altitudes (SCATHA) satellite during its operation between March 1979 and June 1980 was conducted. Statistical analyses of the 100 eV to 5 MeV particle populations at near-geosynchronous altitudes were performed. The analyses ordered the electron and ion density and flux data in KP, L-shell, and local time (LT). Comparisons of measured magnetic fields with the Olson-Pfitzer magnetic field model were also made. Results of the analyses are presented in a form useful for spacecraft design engineers. Author (GRA)

N84-11202# Deutsche Forschungsanstalt fuer Hubschrauber und Vertikalflugtechnik, Stuttgart (West Germany). Inst. fuer Technische Physik.
ANALYSIS OF BEAM INTERACTION OF THE ELECTRICAL THRUSTER RIT 10 (PARTICLE EMISSION) WITH SURFACES Ph.D. Thesis - Giessen Univ., West Germany
Peter Schaefer Dec. 1982 114 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-826)
(DFVLR-FB-83-04) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 39,30

The interaction of ion thrusters with satellite surfaces is examined. Typical surface materials were exposed to electrical thrusters for 1000 to 1900 thrusting hours. Results indicate no difficulty in employing ion thrusters on satellites for 7 to 10 years if appropriate shielding arrangements are used. Author (ESA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N84-11203 Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DYNAMIC ANALYSIS OF SPACECRAFT TRAJECTORY AND ATTITUDE IN AN ORBITAL INSERTION [ANALISE DINAMICA DA TRAJETORIA E DA ATITUDE DE UM VEICULO ESPACIAL NA FASE DE INJECAO]
Paulo Donato Allemand Borges Aug. 1983 232 p refs In PORTUGUESE; ENGLISH summary
(INPE-2845-TDL/142) Avail: NTIS HC A11/MF A01

The attitude and trajectory dynamics of a satellite and solid propellant rocket engine, with hypothesis of rigid body mechanics, is modelled and analyzed in an orbital injection. A numerical algorithm based on the model above is set up to minimize the injection errors, taking into account realizable thrust and mass ejection rates for rocket engine. Spacecraft engineering tolerance are discussed as they disturb land area converage (orbit inclination) by the satellite and its lifetime (eccentricity and semi major axis). A classic yo-yo despin device project to null the spacecraft angular motion about its center of mass, in orbital flight is presented, as well as a previous discussion as when to release this gadget.
Author

N84-11204# Committee on Science and Technology (U. S. House).
THE SPACE NUCLEAR REACTOR PROGRAM
Washington GPO 1983 297 p Hearing before the Subcomm. on Energy Res. and Prod. and the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 25, 24 May 1983
(GPO-22-828) Avail: Subcommittee on Energy Research and

Production

Space nuclear electric power research and development activities are reviewed as a part of the overall planning needed for a variety of high power civil, scientific, and military missions. The major elements include safety, mission analysis and requirements, system definition, and nuclear and aerospace technology development. S.L.

N84-11205# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ION THRUSTER PROJECT [PROJETO DE UM PROPULSOR IONICO]

Guilherme Esteves Perche Jul. 1983 16 p In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC, Belem, Paraguay, 6-13 Jul. 1983

(INPE-2803-PRE/363) Avail: NTIS HC A02/MF A01

The mercury bombardment electrostatic ion thruster is the most successful electric thruster available today. A 5 cm diameter ion thruster with 3,000 s specific impulse and 5 mN thrust is described. The advantages of electric propulsion and the tests that will be performed are also presented. Author

N84-11206*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

RESISTOJET PROPULSION FOR LARGE SPACECRAFT SYSTEMS

Michael J. Mirtich [1982] 32 p refs Presented at the 16th Intern. Elec. Propulsion Conf., New Orleans, 17-19 Nov. 1982; sponsored by AIAA, the Japan Soc. for Aeron. and Space Sci., and Deutsche Gesselschaft fur Luft-und Raumfahrt

(NASA-TM-83489; E-1813; NAS 1.15:83489) Avail: NTIS HC A03/MF A01 CSCL 21H

Resistojet propulsion systems have characteristics that are ideally suited for the on-orbit and primary propulsion requirements of large spacecraft systems. These characteristics which offer advantages over other forms of propulsion are reviewed and presented. The feasibility of resistojets were demonstrated in space whereas only a limited number of ground life tests were performed. The major technology issues associated with these ground tests are evaluated. The past performance of resistojets is summarized and, looks into the present day technology status is reviewed. The material criteria, along with possible concepts, needed to attain high performance resistojets are presented. S.L.

N84-11207# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AREAS OF THE RATIONAL USE OF DIFFERENT SPACECRAFT POWER SYSTEMS

A. A. Kuladin, S. V. Timashev, and V. P. Ivanov 31 Mar. 1983 6 p Transl. into ENGLISH from the mono. "Energeticheskiye Sistemy Kosmicheskikh Apparatov" Moscow, 1982 p 418-420 (AD-A129340; FTD-ID(RS)T-0307-83) Avail: NTIS HC A02/MF A01 CSCL 05/2

The conditions in which the use of onboard reaction engines are most appropriate are investigated according to the type of source and converter of primary energy. Such conditions include the necessary average values of electrical power, the change in the required power during a definite period of time (during one revolution of the spacecraft, during one day, etc.), duration of active functioning of the spacecraft and the effect of the surrounding medium (resistance of the atmosphere, radiation belt, etc.), and the total required power of the characteristic speed. The use of the onboard power system is determined by the totality of the separate criteria and indices of comparative efficiency of their main elements: power and propulsion plants and devices for the removal of heat released in the operation of the different onboard users. GRA

N84-11208# Acurex Corp., Mountain View, Calif.

PARTICLE IMPACT EROSION. VOLUME 3. USER'S MANUAL CHAMBER FLOWFIELD CODE (CFC) AND CHARRING MATERIAL ABLATION-EROSION (CMAE) CODE Technical Report, 1 Feb. 1979 - 31 Dec. 1981

Z. Chiba and R. Beck May 1983 106 p refs Prepared in cooperation with Aerojet Strategic Propulsion Co., Sacramento, Calif. 4 Vol.

(Contract F04611-79-C-0012; AF Proj. 3059)

(AD-A131007; AEROTHERM-UM-82-15/ATD-Vol-3; AFRPL-TR-83-0013-Vol-3) Avail: NTIS HC A06/MF A01 CSCL 21/8

An experimental and analytical program to develop a methodology to predict total recession, including the contribution by particle impact erosion in solid propellant rocket nozzles is discussed. Particle impact erosion in the expansion region of nozzles was studied, as well as recession due to erosion coupled with ablation in the entrance and throat regions of nozzles. R.J.F.

N84-11209# Acurex Corp., Mountain View, Calif.

PARTICLE IMPACT EROSION. VOLUME 4. USER'S MANUAL EROSION PREDICTION PROCEDURE FOR ROCKET NOZZLE EXPANSION REGION Technical Report, 1 Feb. 1979 - 31 Dec. 1981

J. D. Mockenhaupt and J. H. Wickman May 1983 101 p refs Prepared in cooperation with Aerojet Strategic Propulsion Co., Sacramento, Calif. 4 Vol.

(Contract F04611-79-C-0012; AF Proj. 3059)

(AD-A131008; AEROTHERM-LAX-FR-01; AFRPL-TR-83-0013-Vol-4) Avail: NTIS HC A06/MF A01 CSCL 21/8

An experimental and analytical program was conducted to develop a methodology to predict total recession, including the contribution by particulate impact erosion, in solid propellant rocket nozzles. Under Phase 1, a methodology was developed for predicting recession due to particle impact erosion in the expansion (exit cone) region of nozzles. Under Phase 2, a methodology was developed for predicting recession due to erosion coupled with ablation in the entrance and throat regions of nozzles. GRA

N84-11210# Army Missile Command, Redstone Arsenal, Ala. Systems Simulation and Development Directorate.

AN APPROACH TO EXPERIMENTAL INVESTIGATION OF JET PLUME EFFECTS ON MISSILE AERODYNAMICS

George M. Landingham Jul. 1982 85 p refs

(AD-A131336; AD-E950417; DRSMI/RD-82-19-TR) Avail: NTIS HC A05/MF A01 CSCL 21/2

An approach to modeling a rocket's plume effects based on the theory of Korst is presented. To implement the modeling scheme an interactive FORTRAN program was developed which designs model nozzles that produce geometrically simular plumes with simular base flow characteristics as prototype nozzles but use are or some other medium instead of a propellant. Included are the modeling theory, experimental results and the FORTRAN program with a sample case. Author (GRA)

N84-11211# Los Alamos Scientific Lab., N. Mex.

SPACE NUCLEAR-SAFETY PROGRAM Progress Report, Feb. 1983

S. E. Bronisz, comp. Aug. 1983 17 p

(Contract W-7405-eng-36)

(DE83-016351; LA-9389-PR) Avail: NTIS HC A02/MF A01

The use of (Pu-238)O2 in radioisotope power systems was studied. DOE

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N84-11212*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CURING OF EPOXY RESINS WITH 1-[DI(2-CHLOROETHOXYPHOSPHINYL) METHYL]-2,4 AND -2,6-DIAMINOBENZENE

John A. Mikroyannidis and Demetrius A. Kourtides Oct. 1983

27 p refs
(NASA-TM-84350; A-9302; NAS 1.15:84350) Avail: NTIS HC A03/MF A01 CSCL 11G

Fire resistant compositions were prepared using 1-[di(2-chloroethoxy-phosphinyl)methyl]-2,4- and -2,6-diaminobenzene (DCEPD) as a curing agent for typical epoxy resins such as EPON 828 (Shell), XD 7342 (Dow), and My 720 (Ciba Geigy). In addition, compositions of these three epoxy resins with common curing agents such as m-phenylenediamine (MPD) or 4,4'-diaminodiphenylsulphone (DDS) were studied to compare their reactions with those of DCEPD. The reactivity of the three curing agents toward the epoxy resins, measured by differential calorimetry (DSC), was of the order MPD > DCEPD > DDS. The relatively lower reactivity of DCEPD toward epoxy resins was attributed to electronic effects. Author

24 COMPOSITE MATERIALS

Includes laminates.

N84-11213* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLUOROETHER MODIFIED EPOXY COMPOSITES Patent
Robert W. Rosser (San Jose State Univ.) and Mark S. Taylor, inventors (to NASA) (San Jose State Univ.) Issued 18 Oct. 1983 5 p Filed 23 Dec. 1982 Supersedes N83-17603 (21 - 08, p 1145) Sponsored by NASA
(NASA-Case-ARC-11418-1; US-Patent-4,410,682;
US-Patent-Appl-SN-452464; US-Patent-Class-528-110;
US-Patent-Class-523-435; US-Patent-Class-523-456;
US-Patent-Class-528-361) Avail: US Patent and Trademark Office CSCL 11D

Addition of controlled amounts of perfluorinated alkyl ether diacyl fluoride to epoxy resin systems prior to cure results in a formulation which, exhibits improved energy absorbing properties.
Official Gazette of the U.S. Patent and Trademark Office

N84-11214* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
METAL MATRIX COMPOSITE STRUCTURAL PANEL CONSTRUCTION Patent
Robert R. McWithey, Dick M. Royster, inventors (to NASA), and Thomas T. Bales Issued 25 Oct. 1983 8 p Filed 30 Jun. 1981
(NASA-Case-LAR-12807-1; US-Patent-4,411,380;
US-Patent-Appl-SN-280155; US-Patent-Class-228-181;
US-Patent-Class-52-806; US-Patent-Class-52-808;
US-Patent-Class-228-157; US-Patent-Class-228-212;
US-Patent-Class-244-119; US-Patent-Class-244-123;
US-Patent-Class-428-593) Avail: US Patent and Trademark Office CSCL 11D

Lightweight capped honeycomb stiffeners for use in fabricating metal or metal/matrix exterior structural panels on aerospace type vehicles and the process for fabricating same are disclosed. The stiffener stringers are formed in sheets, cut to the desired width and length and brazed in spaced relationship to a skin with the honeycomb material serving directly as the required lightweight stiffeners and not requiring separate metal encasement for the exposed honeycomb cells.
Official Gazette of the U.S. Patent and Trademark Office

N84-11215 Columbia Univ., New York.
NONLINEAR RESPONSE AND NOISE TRANSMISSION OF DOUBLE WALL SANDWICH PANELS Ph.D. Thesis
Hong-Ki Hong 1982 106 p
Avail: Univ. Microfilms Order No. DA8307582

The nonlinear response of a double wall sandwich panel system subjected to random type loading is predicted. Viscoelastic and nonlinear spring dashpot models are chosen to characterize the behavior of the core. The noise transmission through this panel system into an acoustic enclosure of which the interiors are covered with porous absorption materials is determined. The absorbent boundary conditions of the enclosure are accounted for by a two step transformation of the boundary effect into a wave equation which governs the acoustic pressure field inside the enclosure. The nonlinear panel response and interior acoustic pressure are obtained by utilizing modal analyses and Monte Carlo simulation techniques. Numerical results include the response spectral densities, root mean square responses, probability density function histograms, crossing rates, and noise reduction. It is found that by proper selection of the dynamic parameters and damping characteristics, the structural response and noise transmission can be significantly reduced. Dissert. Abstr.

N84-11216 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ADVANCED FATIGUE DAMAGE DEVELOPMENT IN GRAPHITE EPOXY LAMINATES Ph.D. Thesis
Russell Douglas Jamison 1982 235 p
Avail: Univ. Microfilms Order No. DA8310702

Results of an experimental investigation of damage development in T300/5208 graphite epoxy laminates subjected to tension-tension cyclic loading are reported. The concept of laminate stiffness reduction as a damage analogue is shown to be a valuable means of test control and damage interpretation. The relationship between stiffness and number of cycles is shown to be unique for each laminate type studied, each possessing three distinct stages, but markedly different among the laminate types. by using two complementary nondestructive evaluation (NDE) techniques, edge replication and penetrant-enhanced stereo X ray radiography along with a method for deplying fatigue damaged specimens, the states of stiffness reduction were found to correspond variously to the predominance of matrix cracking or delamination or interactions of these matrix damage modes. Dissert. Abstr.

N84-11217 Michigan State Univ., East Lansing.
MODIFICATIONS OF THE BOUNDARY-ELEMENT METHOD FOR APPLICATION TO BENDING OF LAYERED COMPOSITES Ph.D. Thesis
David Howard Harry 1982 188 p
Avail: Univ. Microfilms Order No. DA8308948

Modifictions of the Boundary-Element Method (BEM), which improve accuracy of bending problem solutions, are presented. The direct and indirect methods are discussed as are the modifications of both methods for the purpose of improving accuracy. Prior to application to layered comosites, it is necessary to concentrate on beam bending problems since BEM has not modeled beam bending satisfactorily. The modifications are illustrated by modeling beam problems and comparing the results with beam theory and elasticity solutions. The most beneficial modification is obtained, with the indirect-method, by moving the potential sources outside the problem boundary. This procedure is not defined in the direct-method, so further work is limited to the indirect-method. Another modification which resulted in improvement is the addition of rotation and moment boundary conditions along with additional required potential sources.
Dissert. Abstr.

N84-11218*# Materials Sciences Corp., Spring House, Pa.
GUIDELINES FOR COMPOSITE MATERIALS RESEARCH RELATED TO GENERAL AVIATION AIRCRAFT Final Report, 3 Aug. 1979 - 15 Apr. 1983
Norris F. Dow, E. A. Humphreys, and B. W. Rosen Washington NASA Sep. 1983 226 p refs
(Contract NAS1-16804)
(NASA-CR-3720; NAS 1.26:3720; MSC-TFR-1314/0209) Avail: NTIS HC A11/MF A01 CSCL 11D

Guidelines for research on composite materials directed toward the improvement of all aspects of their applicability for general aviation aircraft were developed from extensive studies of their performance, manufacturability, and cost effectiveness. Specific areas for research and for manufacturing development were identified and evaluated. Inputs developed from visits to manufacturers were used in part to guide these evaluations, particularly in the area of cost effectiveness. Throughout the emphasis was to direct the research toward the requirements of general aviation

aircraft, for which relatively low load intensities are encountered, economy of production is a prime requirement, and yet performance still commands a premium. A number of implications regarding further directions for developments in composites to meet these requirements also emerged from the studies. Chief among these is the need for an integrated (computer program) aerodynamic/structures approach to aircraft design. Author

N84-11219*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PREDICTION OF IMPACT FORCE AND DURATION DURING LOW VELOCITY IMPACT ON CIRCULAR COMPOSITE LAMINATES
K. N. Shivakumar, W. Elber, and W. Illg Oct. 1983 33 p refs
(NASA-TM-85703; NAS 1.15:85703) Avail: NTIS HC A03/MF A01 CSCL 11D

Two simple and improved models--energy-balance and spring-mass--were developed to calculate impact force and duration during low velocity impact of circular composite plates. Both models include the contact deformation of the plate and the impactor as well as bending, transverse shear, and membrane deformations of the plate. The plate was transversely isotropic graphite/epoxy composite laminate and the impactor was a steel sphere. Calculated impact forces from the two analyses agreed with each other. The analyses were verified by comparing the results with reported test data. Author

N84-11220*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SURFACE ANALYSIS OF GRAPHITE FIBER REINFORCED POLYIMIDE COMPOSITES
D. L. Messick (Virginia Polytechnic Inst. and State Univ., Blacksburg), D. J. Progar, and J. P. Wightman Oct. 1983 21 p refs Presented at the 15th Natl. SAMPE Tech. Conf., Cincinnati, 4-6 Oct. 1983
(Contract NAG1-248)
(NASA-TM-85700; NAS 1.15:85700) Avail: NTIS HC A02/MF A01 CSCL 11D

Several techniques have been used to establish the effect of different surface pretreatments on graphite-polyimide composites. Composites were prepared from Celion 6000 graphite fibers and the polyimide LARC-160. Pretreatments included mechanical abrasion, chemical etching and light irradiation. Scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS) were used in the analysis. Contact angle of five different liquids of varying surface tensions were measured on the composites. SEM results showed polymer-rich peaks and polymer-poor valleys conforming to the pattern of the release cloth used durng fabrication. Mechanically treated and light irradiated samples showed varying degrees of polymer peak removal, with some degradation down to the graphite fibers. Minimal changes in surface topography were observed on concentrations of surface fluorine even after pretreatment. The light irradiation pretreatment was most effective at reducing surface fluorine concentrations whereas chemical pretreatment was the least effective. Critical surface tensions correlated directly with the surface fluorine to carbon ratios as calculated from XPS. Author

N84-11221# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
ON THE OPTIMAL DESIGN OF BIDIRECTIONAL COMPOSITES Report, Jun. 1982 - May 1983
Dietmar P. Wurzel (DFVLR, Stuttgart) Jun. 1983 34 p refs
(AF Proj. 2419)
(AD-A131353; AFWAL-TR-83-4060) Avail: NTIS HC A03/MF A01 CSCL 11/4

The intention of this report is to develop a feeling for the directional properties of laminated composites. Easy to understand and to use rules for the versatile application of anisotropic, though orthotropic bidirectional laminates are presented. Simple examples and charts demonstrate the possible weight advantages over quasi-isotropic configurations. Explicit use is made of the Mohr's circle representation. Multiple loading is considered and a graphic solution is indicated. Author (GRA)

N84-11222# Army Materials and Mechanics Research Center, Watertown, Mass.
THE EFFECT OF MOISTURE ON THE PROPERTIES OF AN ARAMID/EPOXY COMPOSITE Final Report
Margaret E. Roylance May 1983 153 p
(DA Proj. 1L1-62105-AH-84)
(AD-A131132; AMMRC-TR-83-21) Avail: NTIS HC A08/MF A01 CSCL 11/4

An investigation has been carried out concerning the effects of moisture on the mechanical properties of a unidirectionally reinforced Kevlar/epoxy composite. The matrix chosen was a so-called high performance epoxy-Fiberite 934. It consists primarily of tetraglycidyl-methylene dianaline (TGMDA) cured with diaminodiphenyl sulfone (DDS) at 177 C (350 F). The material was characterized by liquid chromatography, differential scanning calorimetry, torsional braid analysis, and Fourier transform infrared spectroscopy, in order to assure continuity with future work. Author (GRA)

N84-11223# Sandia Labs., Albuquerque, N. Mex.
PARTICLE-TEAR ENERGY CONTRIBUTION TO THE TOUGHNESS OF RUBBER-MODIFIED EPOXIES
S. C. Kunz and J. A. Sayre 1983 6 p refs Presented at 186th Natl. Meeting of the Am. Chem. Soc., Washington, D.C., 28 Aug. 1983
(Contract DE-AC04-76DP-00789)
(DE83-010396; SAND-83-0785C; CONF-830814-2) Avail: NTIS HC A02/MF A01

A previously developed model for the toughening effect of rubber particles in rubber-modified epoxies is tested. The model predicts a correlation between toughness of rubber-modified expoxies and tear energy of the dispersed rubber phase. Particulate tear energies are obtained from tear strains of the particles measured in-situ during crack propagation through the composite. Two types of rubber-modified epoxy which were exposed to various levels of gamma radiation are used to determine the effect of radiation-induced crosslinking on tear energy of the rubber particles. The toughness data of the irradiated composites only partially follow the trend predicted by the particle tear energy model. The toughness of the rubber-modified epoxies increases to a maximum and then decreases at high radiation levels whereas the predicted values increase monotonically with radiation level. Tearing rate and viscoelastic effects on tear energy and particle debonding are believed to cause the discrepancies between the predicted and measured behavior. DOE

N84-11224# Bendix Corp., Kansas City, Mo.
SOLVENT STRESS-CRACKING STUDY FOR A MATRIX MATERIAL
G. W. Bohnert Jun. 1983 30 p refs
(Contract DE-AC04-76DP-00613)
(DE83-014075; BDX-613-2949) Avail: NTIS HC A03/MF A01

Solvent stress cracking tests were conducted on several alternate resins being considered for molding a matrix. Two resins showed solvent resistance equal to or better than the present material. Information useful in predicting safe and breaking stress levels for matrices exposed to solvent was generated. DOE

N84-11225# Ames Lab., Iowa.
INTERCALATE PHONON DENSITIES OF STATES FOR ALKALI-GRAPHITE COMPOUNDS
W. A. Kamitakahara and H. Zabel (Illinois Univ., Urbana-Champaign) Nov. 1982 6 p refs Presented at 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management (Mater. Res. Soc.), Boston, 1 Nov. 1982
(Contract W-7405-eng-82)
(DE83-016515; IS-M-422; CONF-821107-57) Avail: NTIS HC A02/MF A01

Neutron scattering methods were used to determine the partial phonon densities of states g/sub M/(nu) for in-plane vibrations of

M atoms in MC/sub x/ compounds, where M = K, Rb or Cs, and x = 8, 24, 36. Only modes with both phonon wave vectors and displacements in the basal plane are represented in g/sub M/(nu). Detailed measurements of the temperature dependence were made for RbC24 and KC24, in order to study the influence of the order-disorder transformations in these compounds. The results are interpreted in terms of different pictures of the disordered state. DOE

N84-11226# Schunk und Ebe G.m.b.H., Giessen (West Germany). Bereicht aus Forschung und Entwicklung.

TORSION CHARACTERISTICS OF ISOTROPIC AND CARBON FIBER REINFORCED CARBONS [TORSIONSEIGENSCHAFTEN ISOTROPER UND KOHLENSTOFFASERVERSTAERKTER KOHLENSTOFFE]

W. Huettner 1983 10 p refs In GERMAN
(Rept-35) Avail: NTIS HC A02/MF A01

The static and dynamic torsion characteristics of polygranular carbons were investigated. A universal testing machine was developed. Hard coal, electrographite, and carbon fiber reinforced carbon types were tested. The hard coals have the highest torsion strength, followed by electrographite and carbon fiber reinforced carbon. The torsion strength of non-fiber-reinforced isotropic carbon can be approximately correlated to the corresponding bending fracture strength. Carbon fiber reinforced carbon composites torsion strengths are substantially lower than the corresponding bending fracture strengths, their fracture behavior is not catastrophically brittle. Hard coal and electrographite are brittle. For all carbon types 60% of the fracture load can be taken as lower limit of the dynamic torsion strengths. Microfractographic analysis can be used for heterogeneous materials. Author (ESA)

N84-11227# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.

BALLISTIC IMPACT ON CARBON FIBER REINFORCED EPOXY COMPOSITES

Elise Halloff 24 May 1983 37 p refs
(FOA-C-20497-F9; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

Unloaded carbon fiber epoxy laminates (2.5 mm) were impacted with 6 and 8 mm spherical projectiles. Visible impact damage is always more extended on the back face than on the front face; in the fiber direction of the surface plies than perpendicular to this direction; and when the impact velocity is close to the limiting value of penetration (whether lower or higher) than well above it. Variation of the impact angle changes the effect of fiber orientation relative to the projection of the projectile trajectory on the surface ply. The extension of visible damage is always larger than that of internal damage, except for damage caused by projectiles with velocities close to the limiting velocity for penetration. Projectile velocity is reduced after penetration. Energy absorption increases when impact velocity increases. The degree of absorption is affected by impact angle and projectile diameter (mass).
Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N84-11228*# Ultrasystems, Inc., Irvine, Calif.

SYNTHESIS OF PERFLUOROALKYLENE DIANILINES Final Contractor Report, 5 Sep. 1980 - 5 Nov. 1981

K. L. Paciorek, T. I. Ito, D. H. Harris, C. M. Beechan, J. H. Nakahara, and R. H. Kratzer Nov. 1981 43 p refs
(Contract NAS3-22519)
(NASA-CR-168004; NAS 1.26:168004; SN-1021-F) Avail: NTIS HC A03/MF A01 CSCL 07D

The objective of this contrast was to optimize and scale-up the synthesis of 2,2-bis(4-aminophenyl)-hexafluoropropane and 1,3-bis(4-aminophenyl)hexafluoropropane, as well as to explore avenues to other perfluoroalkyl-bridged dianilines. Routes other than Friedel-Crafts reaction leading to 2,2-bis(4-aminophenyl) hexafluoropropane were investigated. The processes utilizing bisphenol-AF were all unsuccessful; reactions aimed at the production of 4-(hexafluoro-2-halo-isopropyl)aniline from the hydroxyl intermediate failed to yield the desired products. Tailoring the conditions of the Friedel-Crafts reaction of 4-(hexafluoro-2-hydroxyisopropyl)aniline, aniline, and aluminum chloride by using hydrochloride salts and selecting optimum reagent ratios, reaction times, and temperature resulted in approx. 20% yield of pure crystallized 2,2-bis(4-aminophenyl)hexafluoropropane in 0.2 mole reaction batches. Yields up to approx. 40% were realized in small, approx. 0.01 mole, batches. The synthesis of 1,3-bis(4-aminophenyl)hexafluoropropane starting with perfluoroglutarimidine was reinvestigated. The yield of the 4-step reaction sequence giving 1,3-bis(4-acetamidophenyl)hexafluoropropane was raised to 44%. The yield of the subsequent hydrolysis process was improved by a factor of approx. 2. Approaches to prepare other perfluoroalkyl-bridged dianilines were unsuccessful. Reactions reported to proceed readily with trifluoromethyl substituents failed when longer chain perfluoroalkyl groups were employed. Author

N84-11229*# Ultrasystems, Inc., Irvine, Calif.

THERMAL OXIDATIVE DEGRADATION REACTIONS OF PERFLUOROALKLETHERS Contractor Report, 6 Nov. 1981 - 30 Jun. 1983

K. L. Paciorek, D. H. Harris, M. E. Smythe, and R. H. Kratzer Jul. 1983 39 p refs
(Contract NAS3-22517)
(NASA-CR-168224; NAS 1.26:168224; SN-1020-A2-F) Avail: NTIS HC A03/MF A01 CSCL 07D

The objective of this contract was to investigate the mechanisms operative in thermal and thermal oxidative degradation of Fomblin Z and hexafluoropropene oxide derived fluids and the effect of alloys and additives upon these processes. The nature of arrangements responsible for the inherent thermal oxidative instability of the Fomblin Z fluids has not been established. It was determined that this behavior was not associated with hydrogen end-groups or peroxy linkages. The degradation rate of these fluids at elevated temperatures in oxidizing atmospheres was found to be dependent on the surface/volume ratio. Once a limiting ratio was reached, a steady rate appeared to be attained. Based on elemental analysis and oxygen consumption data, -CF2OC-F2CF2O-, not -CF2CF2O-, is one of the major arrangements present. The action of the M-50 and Ti(4 Al, 4 Mn) alloys was found to be much more drastic in the case of Fomblin Z fluids than that observed for the hexafluoropropane oxide derived materials. The effectiveness of antioxidation/anticorrosion additives, P-3 and phospha-s-triazine, in the presence of metal alloys was very limited at 316 C; at 288 C the additives arrested almost completely the fluid degradation. The phospha-s-triazine appeared to be at least twice as effective as the P-3 compound; it also protected the coupon better. The Ti(4 Al, 4 Mn) alloy degraded the fluid mainly by chain scission processes; this took place to a much lesser degree with M-50. B.W.

N84-11230*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METALLURGICAL CHARACTERIZATION OF THE FRACTURE OF SEVERAL HIGH STRENGTH ALUMINUM ALLOYS

M. Dilip Bhandarkar and W. Barry Lisagor Dec. 1977 71 p refs
(NASA-TP-1086; L-11255; NAS 1.60:1086) Avail: NTIS HC A04/MF A01 CSCL 11F

The fracture behavior for structural aluminum alloys (2024, 6061, 7075, and 7178) was examined in selected heat treatments. The investigation included tensile, shear, and precracked notch-bend specimens fractured at ambient temperature under monotonic loading. Specimens were obtained from thin sheets and thick plates and were tested in longitudinal and transverse orientations at different strain rates. Microstructures of alloys were examined

using the optical microscope and the scanning electron microscope with associated energy dispersive X ray chemical analysis. Several different types of second phase particles, some not reported by other investigators, were identified in the alloys. Fracture morphology was related to microstructural variables, test variables, and type of commercial product. Specimen orientation examined in the present investigation had little effect on fracture morphology. Test strain rate changes resulted in some change in shear fracture morphology, but not in fracture morphology of tensile specimens. Author

N84-11231*# Tennessee Univ. Space Inst., Tullahoma.
STUDIES OF CONVECTION IN A SOLIDIFYING BINARY MIXTURE AT REDUCED GRAVITY Bimonthly Report, 21 Jul. 1982 - 11 May 1983
B. Antar and F. Collins 11 May 1983 10 p refs
(Contract NAS8-34268)
(NASA-CR-170916; NAS 1.26:170916; BMR-7) Avail: NTIS HC A02/MF A01 CSCL 07D

A great deal of interest was generated recently in the possibility of producing new materials in the reduced gravity environment provided during the forthcoming missions of Spacelab. The range of possibilities extend from producing large crystals of uniform properties to manufacturing materials with unique properties. Most of these processes involve the solidification of materials from the liquid state. Convective motions within the liquid during solidification can influence the local material composite and the shape of the solid-liquid interface which may result in solids with non-uniform properties and crystal defects. The microgravity environment of Spacelab is being viewed as one in which the buoyancy forces are eliminated so that convection driven by thermal gradients does occur, resulting in an improved solidification process. However, convection may occur for other reasons and whether convection is negligible or not during solidification constitutes processing in low-gravity environment. Little information exists presently on convection during solidification under such circumstances. A continuation of an analytical investigation into the nature of convective motion in a binary liquid layer due to surface tension forces during its solidification is reported. The onset of convection will be determined through a stability analysis which is described. Author

N84-11232# California Univ., Irvine. Dept. of Chemistry.
STRUCTURAL EFFECTS ON HYDROGEN BONDING PROPERTIES OF NITRO COMPOUNDS Final Report, Jan. - Dec. 1982
R. W. Taft Mar. 1983 13 p refs
(Contract N60921-82-C-0039)
(AD-A130817) Avail: NTIS HC A02/MF A01 CSCL 07/3

Values of x, the hydrogen bond donor ability of pure protonic solvents, have been obtained for 18 important solvents including nitromethane. The order of x values for C-H acidic solvents is (CH3)2C<CH3CN<CH3NO2<CH2C12<CHC13. GRA

N84-11233# California Univ., Santa Cruz. Center for Coastal Marine Studies.
STUDIES OF THE VOLTAMMETRIC DETERMINATION OF TRACE METALS IN SEAWATER Final Technical Report, 15 Nov. 1981 - 15 Nov. 1982
Kenneth W. Bruland Nov. 1982 38 p
(Contract N00014-82-K-0029)
(AD-A131164) Avail: NTIS HC A03/MF A01 CSCL 07/4

The basic voltammetric cell consists of the analyte whole metal concentration is to be determined and three electrodes. During the cathodic deposition mode, metal ions are reduced by the potential at the working electrode and deposited on the mercury film at the electrode surface as a metal-Hg-amalgam. The potential at the working electrode is induced by the polarograph through the counter electrode with the reference electrode taken as zero. The actual potential of the working electrode depends upon the type of reference of electrode used. Author (GRA)

N84-11234# Aerospace Corp., El Segundo, Calif. Vehicle Engineering Div.
HIGHER ORDER NUMERICAL SIMULATIONS OF THE KNUDSEN LAYER Interim Report, 1 Oct. 1981 - 30 Sep. 1982
R. L. Baker, D. A. Nelson, and J. S. Turner (Texas Univ., Austin) 29 Apr. 1983 61 p refs
(Contract F04701-82-C-0083)
(AD-A131538; SD-TR-83-47; TR-0083(3729)-2) Avail: NTIS HC A04/MF A01 CSCL 07/4

The infinitesimal nonequilibrium region (Knudsen layer) that occurs at phase interfaces when there is net mass transfer, has been theoretically investigated for the case of strong evaporation. The rate of collisional relaxation processes in the layer, which determines the net transfer of mass, momentum, and energy across the layer, has been studied using models at three levels of mathematical complexity (completeness). Calculated results obtained by Monte Carlo direct simulation of the Boltzmann equation and, by the method of Molecular Dynamics, have been compared with approximate solutions based upon the nonlinear mass, momentum, and energy conservation equations. The comparisons indicate the validity of the approximate method in predicting the essential features of the Knudsen layer region, i.e., the net mass transfer rate and the static pressure jump across the layer, for both single and multiple species cases. We are interested in the multispecies case for the interpretation of laser-vaporized carbon ablation data to obtain vapor pressure and vaporization kinetics information. Further use of the higher order solution methods is anticipated to investigate theoretically difficult physical/chemical problems such as the effect of thermal fluctuations in nonlinear chemically reacting systems. Author (GRA)

N84-11235# California Univ., Livermore. Lawrence Livermore Lab.
ELECTROCHEMICAL GENERATION OF N2O5
J. E. Harrar and R. K. Pearson 1983 10 p refs Presented at SRI Intern. Nitrations Conf., Menlo Park, Calif., 27 Jul. 1983
(Contract W-7405-eng-48)
(DE83-013377; UCRL-89293-1; CONF-830760-1) Avail: NTIS HC A02/MF A01

The anodic oxidation of N2O4 in aqueous and anhydrous HNO3 was investigated by controlled potential techniques and found to be an excellent method for the preparation of solutions of N2O5 in anhydrous HNC3. The product solutions can be used directly for the nitrolysis and nitration of organic compounds. The details of the construction of the electrolytic cell and the electrolysis procedure, some aspects of the analytical methods, and the major characteristics of the reaction are presented. DOE

N84-11236# Los Alamos Scientific Lab., N. Mex.
RAMAN SPECTROSCOPIES IN SHOCK-COMPRESSED MATERIALS
S. C. Schmidt, D. S. Moore, and J. W. Shaner 1983 11 p refs Presented at the Conf. on Shock Waves in Condensed Matter, Santa Fe, N. Mex., 18-21 Jul. 1983
(Contract W-7405-eng-36)
(DE83-014170; LA-UR-83-1584; CONF-830719-1) Avail: NTIS HC A02/MF A01

Spontaneous Raman spectroscopy, stimulated Raman scattering and coherent anti-Stokes Raman scattering were used to measure temperatures and changes in molecular vibrational frequencies for detonating and shocked materials. Inverse Raman and Raman induced Kerr effect spectroscopies are suggested as diagnostic probes for determining and phenomenology of shock induced chemical reactions. The practicality, advantages, and disadvantages of using Raman scattering techniques as diagnostic probes of microscopic phenomenology through and immediately behind the shock front of shock compressed molecular systems are discussed. DOE

N84-11237# Energy Concepts Co., Annapolis, Md.
OXYGEN PRODUCTION BY THE MOLTOX PROCESS Final Report
D. C. Erickson Feb. 1983 114 p refs
(Contract DE-AC01-79CS-40287)
(DE83-012847; DOE/CS-40287/T2) Avail: NTIS

HC A06/MF A01

The results of research on chemical separation of oxygen from air are reported. The separation is accomplished by reacting oxygen in air with a molten mixture of alkali metal nitrates and nitrites in an absorber. The salt is then circulated in a closed loop to a desorber, where pure oxygen is released. The research conducted has included a thermodynamic analysis, salt chemistry and corrosion experiments, process analysis, economic projections, and construction and operation of a continuous pilot plant. Results show this oxygen production method to have a 40% lower energy requirement and a 5 to 20% cost advantage when compared with cryogenic plants. DOE

N84-11238# California Univ., Livermore. Lawrence Livermore Lab.

HIGH PRESSURE EQUATION OF STATE OF Li, Na AND K

Marvin Ross, David A. Young, and R. Boehler (California Univ., Los Angeles) 21 Jun. 1983 6 p refs Presented at 9th Intern. Assoc. for the Advan. of High Pressure Sci. and Technol. Conf., Albany, N.Y., 25-28 Jul. 1983 Submitted for publication

(Contract W-7405-eng-48)

(DE83-014844; UCRL-88635; CONF-830768-1) Avail: NTIS HC A02/MF A01

The usefulness of local pseudopotential theory at high pressure by a systematic comparison of experimental Li, Na, and K data with theoretical predictions was examined. Measurements were made for the melting curve to 32 kbar and of delta P/delta T/sub s/ to 32 kbar and 4000 C. Room temperature isotherms were used to determine the two parameter Heine-Abarenkov local pseudopotential. Calculations of the melting curves, liquid isotherms, and delta P/delta T/sub s/ were generally in good agreement with experiment. The major deficiency in the theory appears to stem from the unrealistically soft behavior of the potential at small interatomic separations which lead to negative Grueneisen parameters at high compression. This feature is probably also responsible for some of the disagreements between theoretical and experimental Hugoniots. DOE

N84-11239# Brown Univ., Providence, R. I. Dept. of Engineering.

THERMOPHYSICAL PROPERTIES FOR SYNTHETIC FUELS

Aug. 1983 63 p refs

(DE83-016588; DOE/ER-0172) Avail: NTIS HC A04/MF A01

This country must develop the production of synthetic fuels from coal and shale and survey the need for an adequate data base of physico-chemical properties of substances required by such a synfuels industry. The liquids that occur in the manufacture of synthetic fuels differ from those presently handled by the petroleum industry. The requirements for information on these new materials constitute more than a simple extension of the scope and ranges of existing data bases. Having established a considerably expanded data base, the benefits that would arise are recapitulated. The standard steps conventionally taken to build a computerized data base of thermophysical properties are examined and the needed chemical and physical properties of the fluids which occur in the production of synfuels enumerated. The conclusion is that a computerized data base could not be created now and that, therefore, steps should be taken to start creating a reasonable base for it as soon as possible. Author

N84-11240# Los Alamos Scientific Lab., N. Mex.

LOS ALAMOS MINI-REVIEW. NUMERICAL CALCULATIONS OF HYDROGEN-AIR COMBUSTION

Peter J. ORourke Aug. 1983 4 p

(Contract W-7405-eng-36)

(DE83-016508; LALP-83-25) Avail: NTIS HC A02/MF A01

One serious concern during the accident at Three Mile Island resulted from the generation of a large amount of hydrogen gas and its migration to the containment building. The fear was that combustion of this hydrogen could produce pressures that would breach containment. The Center for Nonlinear Studies at Los Alamos is sponsoring an effort to assess the laboratory's current numerical capabilities to model the combustion of hydrogen air mixtures in realistic geometries. Such detailed numerical models explain very complex experimental behavior. DOE

N84-11241# Oak Ridge National Lab., Tenn. Chemistry Div.

SODIUM-SULFATE SOLUBILITIES IN HIGH-TEMPERATURE (250 TO 3740C) SALT AND ACID SOLUTIONS Final Report

M. H. Lietzke and W. L. Marshall Jul. 1983 72 p refs

(Contract W-7405-eng-26; EPRI Proj. 623-5)

(DE83-015813; EPRI-NP-3047) Avail: NTIS HC A04/MF A01

Experimental measurements of the solubility of Na2SO4 in aqueous solution mixtures of NaCl and H2SO4 were obtained at temperatures from 250 to 3740 C, the temperature range of interest for existing steam generator cycles. The solute compositions, other than Na2SO4, were varied in mole ratio, NaCl only to H2SO4 only and the total solute concentrations were varied from very dilute solutions to 3-4 molal. These solubility measurements were used to calculate the parameters in some semi-theoretical equations from which solubilities of Na2SO4 could be calculated over wide ranges of temperature and composition. From the derived relationships, two computer programs were developed for calculating the extent of boiling concentration that could occur before precipitation of Na2SO4 solid, for example, in a tube crevice (Program I), and the rise in temperature that would occur in the crevice (Program II). The computer programs are given for easy application to power plant operation. DOE

N84-11242# Science Applications, Inc., Chatsworth, Calif. Combustion Science and Advanced Technology Dept.

SPRAY COMBUSTION OF SYNTHETIC FUELS. PHASE 2. SPRAY-COMBUSTION PHENOMENA Final Report, 9 Sep. 1981 - 31 Dec. 1982

May 1983 319 p refs

(Contract DE-AC22-81PC-40276)

(DE83-014541; DOE/PC-40276/5) Avail: NTIS HC A14/MF A01

Physical and chemical processes relevant to synfuel combustion were studied. Data bases applicable to synfuel utilization in industrial combustors were developed along with associated combustion models and synfuel utilization criteria with special emphasis on spray combustion. Results of A literature search on the thermodynamics and kinetics of pyrolysis and oxidation of synthetic fuels, related compounds, and baseline, petroleum-derived fuels are presented. Bench-scale spray dynamics experiments were conducted to obtain data on spray combustion processes. Modular models of the combined aerodynamic and chemical processes of spray combustion were developed to represent basic spray combustor configurations. Chemical kinetics formulations were developed to model pyrolysis, soot formation and oxidation, aliphatic and aromatic hydrocarbon oxidation, and fuel-bound nitrogen conversion. These chemical kinetics formulations were based on the quasi-global approach and were suitable for use in the modular spray combustion model. Models of the overall spray combustion process were used in the design of the experimental facility. The analytical models were refined and tested using the results of experiments conducted in the bench-scale spray dynamics test facility and data from other sources. The results of the modeling and experimental program were used to develop fundamental information relevant to the effective utilization of synfuels in industrial combustion systems. DOE

N84-11243# Brookhaven National Lab., Upton, N. Y. Metallurgy and Materials Science Div.

OPTICAL EMISSION AND MASS SPECTROMETRIC STUDIES OF PLASMA DEPOSITION

F. J. Kampas and R. R. Corderman 1983 4 p refs Presented at the 10th Intern. Conf. on Amorphous and Liquid Semiconductors, Tokyo, 22 Aug. 1983

(Contract DE-AC02-76CH-00016)

(DE83-016700; BNL-33440; CONF-830895-2) Avail: NTIS HC A02/MF A01

Optical emission spectroscopy and mass spectrometry provide complementary information about glow discharge deposition processes. Emission intensities can be used to determine dependences of electron concentration and energy distribution on

discharge parameters. Measurement of concentrations of chemical species in the discharge by mass spectrometry leads to chemical kinetic models of polymerization processes. DOE

N84-11244# Fraunhofer-Inst. fuer Solare Energiesysteme, Freiburg (West Germany).
MASS SPECTROMETRIC ANALYSIS OF SILICON FOR SOLAR CELLS Final Report, Oct. 1981
Albert Hurrle Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 31 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-134; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,50

Solid and powdered silicon samples were analyzed by spark source mass spectrometry. Gallium was used as a binder to press solid electrodes from powdered samples. Relative sensitivity factors were determined for all important elements with the exception of C and S. By comparison with other analytical methods it is shown that the analytical results obtained from powdered Si are accurate within a factor of two. Detection limits for most elements are in the range 0.02 - 1ppma. Author (ESA)

N84-11245# Conradty (C.) G.m.b.H. und Co. K.G., Nuernberg (West Germany).
RECYCLING OF NOBLE METALS IN CONNECTION WITH ELECTROCHEMICAL PROCESSES Final Report, Aug. 1980
Christine Zoellner Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 95 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-140; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20

The recovery of platinum metal components from deactivated titanium electrode coatings is studied. Removal by mechanical, chemical and thermal means, such that the titanium substrate remains unaffected was emphasized. A thermal oxidative method of removal via formation of a nonbinding oxide coating was developed. The kinetics of oxidation of coated and uncoated titanium, between 600 and 900 C, and the morphology of the layers of nonbinding oxide formed were followed using thermogravimetric and scanning electron microscope techniques. It is shown that the geometry of the electrode surface has a considerable influence on the adhesiveness of the thermally formed oxide coatings. The working parameter for complete removal of the coatings was defined such that not more than 5 microns of titanium substrate thickness was removed. Working up procedures for platinum metal containing blasting corundeum waste from conventional blasting operations were also studied. Air jet sieving and wind sifting give a satisfactory enrichment of the finest dust containing platinum metals. Author (ESA)

N84-11246# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A METHOD FOR THE PREPARATION OF SMALL PARTICLES OF PURE COMPOUNDS OR OF COMPOUNDS CONTAINING SMALL AMOUNTS OF FOREIGN ELEMENTS
Lars-Henrik Andersson 3 Aug. 1983 11 p ref
(FOA-C-20502-A1; ISSN-0347-3694) Avail: NTIS HC A02/MF A01

Methods for preparing 2 to 5 micron diameter particles were compared. The best method is an application of the Soxhlet extractor technique, in which the extractant is a sparingly soluble substance or a mixture of two such substances. The extracting liquid is pure water or water containing different amounts of hydrochloric acid. If, e.g., calcium fluoride is mixed with uranium tetrafluoride and the mixture extracted with dilute hydrochloric acid, small crystals (diameter 2 to 30 microns) containing uranium (in amounts around 1% depending of the acid concentration) appear after days or weeks in the flask where the hydrochloric acid was boiled. Author (ESA)

N84-11247# National Bureau of Standards, Washington, D.C. National Engineering Lab.
SIGNIFICANCE OF A WALL EFFECT IN ENCLOSURES WITH GROWING FIRES
Leonard Y. Cooper Jun. 1983 44 p refs
(PB83-235671; NBSIR-83-2730) Avail: NTIS HC A03/MF A01 CSCL 13M

This paper studies the significance of a wall effect that has been observed during the growth stages of enclosure fire experiments. Relative to the two-layer phenomenon which tends to develop during such experiments, the effect has to do with the near-wall downward injection of hot upper layer gases into the relatively cool uncontaminated lower layer. It is conjectured that these observed wall flows are buoyancy driven, and that they develop because of the relatively cool temperature of the upper wall whose surfaces are in contact with the hot upper layer gases. Author (GRA)

N84-11248# Pennsylvania Univ., Philadelphia. Dept. of Physics.
EXPERIMENTAL STUDIES OF THE GEOMETRIC AND ELECTRONIC STRUCTURE OF CHEMISORPTION BONDING Annual Report, Jan. - Dec. 1982
T. Gustafsson and E. W. Plummer Jun. 1983 20 p refs
(PB83-243949; GRI-81/0150) Avail: NTIS HC A02/MF A01 CSCL 07D

The goal of this program was to understand on an atomistic level the chemical reactions of small molecules with metal surfaces. The procedure was to study well characterized single crystal surfaces which have been prepared and characterized in a controlled ultrahigh vacuum environment. The surfaces are studied primarily with electron spectroscopies such as photoemission or electron loss. Author (GRA)

N84-11249# National Bureau of Standards, Washington, D.C.
LASER-COOLED AND TRAPPED ATOMS Final Report
William D. Phillips, ed. Jun. 1983 176 p refs Proc. of the Workshop on Spectroscopic Appl. of Slow Atomic Beams, Gaithersburg, Md., 14-15 Apr. 1983 Sponsored in part by ONR
(PB83-238196; NBS-SP-653; LC-83-600541) Avail: NTIS HC A09/MF A01 CSCL 07D

Laser cooling of atomic beams, gases, and trapped particles and on trapping of neutral atoms in laser, electric, and magnetic fields are discussed. Applications of cooled atoms to spectroscopy and to time and frequency standards are discussed. The present status and directions of research in time and frequency standards are also discussed. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N84-11250 Illinois Inst. of Tech., Chicago.
METAL-INDUCED EMBRITTLEMENT OF HIGH PURITY 4140 STEEL BY INDIUM OR INDIUM-TIN EUTECTIC ALLOY Ph.D. Thesis
Alan Peter Druschitz 1982 267 p
Avail: Univ. Microfilms Order No. DA8307033

Cracking due to Metal-Induced Embrittlement (MIE) of a high purity 4140 steel in contact with solid or liquid embrittler (pure indium or indium-tin eutectic alloy) was investigated. Constant load, delayed failure tensile tests were performed in vacuum (approximately .0001 torr) using an electrical potential drop measurement which was capable of separating the stages of crack initiation and crack propagation. The activation energy for crack initiation was determined to be approximately 34 kcals/mole for both indium and indiun-tin alloy in both the solid and liquid state. The process of MIE crack initiation is best described by the grain boundary penetration model proposed by Gordon and An. No activation energy was determined for crack propagation due to indium in the solid state since the crack propagation rate was observed to

increase at an increasing rate as the embrittler melting point was approached supporting surface self-diffusion as the embrittler transport mechanism for SMIE. Dissert. Abstr.

N84-11251# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DETERMINATION OF COMPOSITION PROFILE FOR ISOMORPHIC BINARY ALLOYS [DETERMINACAO DO PERFIL DE COMPOSICAO EM LIGAS BINARIAS ISOMORFAS]
C. Ying An and I. N. Bandeira Jul. 1983 9 p refs In PORTUGUESE; ENGLISH summary
(INPE-2813-RPE/438) Avail: NTIS HC A02/MF A01

The inhomogeneity along the growth axis of the pseudo-binary alloys is due to the segregation of the solute which is mixed in the melt due to convective and diffusive flows. A process for determination of the exact composition profile by measurements of the crystal density, for alloys of the type A(1-x)Bx, is shown. Author

N84-11252# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LIDAR STUDIES OF THE ALKALI METALS
B. R. Clemesha Sep. 1983 21 p refs Presented at the IUGG Gen. Assembly, Hamburg, Aug. 1983
(INPE-2892-PRE/411) Avail: NTIS HC A02/MF A01

The development of the lidar technique in the early sixties, and the subsequent introduction of tunable lasers, made accurate measurements of the vertical distribution of the alkali metals in the atmosphere possible for the first time. Over the last decade a great deal of information has been obtained on the spatial and temporal variations of sodium, and rather less information has been obtained about potassium and lithium. The possibility of making continuous observations of the vertical distribution of sodium, coupled with temperature measurements via the determination of the Doppler spectrum of the returned lidar signal, offers a potentially useful technique for studying the dynamics of the 80 to 100 km region of the atmosphere. Author

N84-11253*# Lockheed-California Co., Burbank.
LOW-TEMPERATURE FORMING OF BETA TITANIUM ALLOYS Report, Nov. 1978 - Apr. 1983
R. S. Kaneko and C. A. Woods Washington NASA Sep. 1983 211 p refs
(Contract NAS1-15568)
(NASA-CR-3706; NAS 1.26:3706; LR-30404) Avail: NTIS HC A10/MF A01 CSCL 11F

Low cost methods for titanium structural fabrication using advanced cold-formable beta alloys were investigated for application in a Mach 2.7 supersonic cruise vehicle. This work focuses on improving processing and structural efficiencies as compared with standard hot formed and riveted construction of alpha-beta alloy sheet structure. Mechanical property data and manufacturing parameters were developed for cold forming, brazing, welding, and processing Ti-15V-3Cr-3Sn-3Al sheet, and Ti-3Al-8V-6Cr-4Zr on a more limited basis. Cost and structural benefits were assessed through the fabrication and evaluation of large structural panels. The feasibility of increasing structural efficiency of beta titanium structure by selective reinforcement with metal matrix composite was also explored. Author

N84-11254*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIZE SCALE EFFECT IN CAVITATION EROSION
P. Veerabhadra Rao, B. C.Syamala Rao, and Donald H. Buckley [1982] 11 p refs
(NASA-TM-83533; E-1538-1; NAS 1.15:83533) Avail: NTIS HC A02/MF A01 CSCL 11F

An overview and data analyses pertaining to cavitation erosion size scale effects are presented. The exponents n in the power law relationship are found to vary from 1.7 to 4.9 for venturi and rotating disk devices supporting the values reported in the literature. Suggestions for future studies were made to arrive at further true scale effects. Author

N84-11255*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSMISSION ELECTRON MICROSCOPY CHARACTERIZATION OF MICROSTRUCTURAL FEATURES OF Al-Li-Cu ALLOYS
M. Avalos-Borja, Patrick P. Pizzo (San Jose State Univ.), and L. A. Larson Oct. 1983 18 p refs
(NASA-TM-84384; A-9407; NAS 1.15:84384) Avail: NTIS HC A02/MF A01 CSCL 11F

A transmission electron microscopy (TEM) examination of aluminum-lithium-copper alloys was conducted. The principal purpose is to characterize the nature, size, and distribution of stringer particles which result from the powder metallurgy (P/M) processing of these alloys. Microstructural features associated with the stringer particles are reported that help explain the stress corrosion susceptibility of the powder metallurgy-processed Al-Li-Cu alloys. In addition, matrix precipitation events are documented for a variety of heat treatments and process variations. Hot rolling is observed to significant alter the nature of matrix precipitation, and the observations are correlated with concomitant mechanical property variations. Author

N84-11256*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STRESS-CORROSION BEHAVIOR OF ALUMINUM-LITHIUM ALLOYS IN AQUEOUS ENVIRONMENTS
Patrick P. Pizzo (San Jose State Univ.), R. P. Galvin, and Howard G. Nelson Oct. 1983 32 p refs
(NASA-TM-85853; A-9499; NAS 1.15:85853) Avail: NTIS HC A03/MF A01 CSCL 11F

The stress corrosion susceptibility of two powder metallurgy (P/M) alloys, Al-Li-Cu and Al-Li-Cu-Mg two mechaically attrited (M/A) alloys, Al-Li-Cu and Al-Li-Mg; and two wrought, ingot alloys, X-2020 and AA7475, are compared. Time-dependent fracture in an aqueous sodium chloride environment under alternate immersion condition was found to vary significantly between alloys. The stress corrosion behavior of the two powder metallurgy processed alloys was studied in detail under conditions of crack initiation, static crack growth, and fatigue crack growth. A variety of stress corrosion tests were performed including smooth surface, time-to-failure tests; potentiostatic tests on smooth surfaces exposed to constant applied strain rates; and fracture mechanics-type tests under static and cyclic loads. Both alloys show surface pitting and subsequent intergranular corrosion. Pitting is more severe in the magnesium-bearing alloy and is associated with stringer particles strung along the extrusion direction as a result of P/M processing. S.L.

N84-11257*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A SURFACE ANALYTICAL EXAMINATION OF STRINGER PARTICLES IN Al-Li-Cu ALLOYS
L. A. Larson, M. Avalos-Borja, and P. P. Pizzo (San Jose State Univ.) Oct. 1983 13 p refs
(NASA-TM-85854; A-9492; NAS 1.15:85854) Avail: NTIS HC A02/MF A01 CSCL 11F

A surface analytical examination of powder metallurgy processed Al-Li-Cu alloys was conducted. The oxide stringer particles often found in these alloys was characterized. Particle characterization is important to more fully understand their impact on the stress corrosion and fracture properties of the alloy. The techniques used were SIMS (Secondary Ion Mass Spectroscopy) and SAM (Scanning Auger Microscopy). The results indicate that the oxide stringer particles contain both Al and Li with relatively high Li content and the Li compounds may be associated with the stringer particles, thereby locally depleting the adjacent matrix of Li solute. Author

N84-11258*# Lockheed Missiles and Space Co., Palo Alto, Calif.
RADIATIVE PROPERTIES OF ADVANCED SPACECRAFT HEAT SHIELD MATERIALS Final Report
G. R. Cunnington, A. I. Funai, and T. K. McNab Washington NASA Nov. 1983 195 p refs
(Contract NAS1-16423)

(NASA-CR-3740; NAS 1.26:3740) Avail: NTIS HC A09/MF A01 CSCL 11F

Experimental results are presented to show the effects of simulated reentry exposure by convective heating and by radiant heating on spectral and total emittance of statically oxidized Inconel 617 and Haynes HS188 superalloys to 1260 K and a silicide coatea (R512E) columbium 752 alloy to 1590 K. Convective heating exposures were conducted in a supersonic arc plasma wind tunnel using a wedge-shaped specimen configuration. Radiant tests were conducted at a pressure of .003 atmospheres of dry air at a flow velocity of several meters per second. Convective heating specimens were subjected to 8, 20, and 38 15-min heating cycles, and radiant heating specimens were tested for 10, 20, 50, and 100 30-min heating cycles. Changes in radiative properties are explained in terms of changes in composition resulting from simulated reentry tests. The methods used to evaluate morphological, compositional and crystallographic changes include: Auger electron spectroscopy; scanning electron microscopy; X-ray diffraction analysis; and electron microprobe analysis. S.L.

N84-11259# Drexel Univ., Philadelphia, Pa. Dept. of Materials Engineering.

MICROSTRUCTURE AND PROPERTIES OF P/M TOOL STEELS

S. Kumar, A. Fareed, M. J. Koczak, and A. Lawley Jun. 1983 29 p refs

(Contract N00014-81-K-0039)

(AD-A130980) Avail: NTIS HC A03/MF A01 CSCL 07/4

A detailed microstructural examination has been made of T15 and Tex 25 high speed tool steels processed from rapidly solidified gas atomized powders, and associated strength and toughness evaluated. Powders were screened into selected size fractions, hot isostatically pressed to full density and heat-treated. Two HIPing temperatures, two austenitizing temperatures and three tempering temperatures were included in the study. Atomized and consolidated materials were characterized utilizing X-ray diffraction, optical and scanning electron microscopy. Both cellular and dendritic structures are present in the atomized powders depending on particle size, with MC carbides primarily at cell boundaries. GRA

N84-11260# United Technologies Corp., East Hartford, Conn.

DEFORMATION STUDIES IN WORKABLE SUPERALLOYS Final Report, 1 Oct. 1979 - 31 May 1983

A. F. Giamei 31 May 1983 118 p refs

(Contract F49620-82-C-0028; AF Proj. 2306)

(AD-A131606; UTRC/R83-916100-1; AFOSR-83-0724TR) Avail: NTIS HC A06/MF A01 CSCL 11/6

A three year workability study of nickel-base superalloys has been completed. The objective was to study the high strain plastic flow behavior of high strength superalloys in the form of single crystals, rapidly solidified ingots and consolidated powder particles. The single crystal alloy studied was PWA 1444 (similar to Mar-M200) which had previously been well characterized at low strains. The flow characteristics of this alloy have now been documented out to 20% strain as a function of crystal orientation. The low to intermediate temperature flow stress has been measured after forming. Remarkable strain hardening has been obtained at low strains for high modulus crystals worked below the solvus temperature. Rapidly solidified and cooled ingots were made by arc melting or electron beam skull melting or induction melting and then 'drip melting' into a cold copper mold. The compositions and heat treatment were tailored to promote workability. Some of these buttons were heavily deformed in uniaxial compression under isothermal conditions below the gamma prime solvus temperature, and several were deformed in the single phase gamma region. High strains were achieved under conditions of constant displacement rate, true strain rate or energy input rate. GRA

N84-11261# Pittsburgh Univ., Pa. Dept. of Metallurgical and Materials Engineering.

FUNDAMENTAL RESEARCH DIRECTED TO ADVANCED HIGH TEMPERATURE COATING SYSTEMS BEYOND THE CURRENT STATE-OF-THE-ART SYSTEMS Annual Report, 1 Jan. - 31 Dec. 1982

G. H. Meier and F. S. Pettit 7 Jun. 1983 51 p refs

(Grant AF-AFOSR-0089-80; AF Proj. 2306)

(AD-A131618; AFOSR-83-0723TR; AR-3) Avail: NTIS HC A04/MF A01 CSCL 11/3

The oxidation in air of nickel-silicon alloys with compositions extending from 5 to 20 weight-silicon have been studied over the temperature interval between 900 and 1100 degs C. In the case of alloys with less than 20% silicon, the silicon is not oxidized internally nevertheless the rates of oxidation are greater than those for alloys upon which alumina scales are formed. The alloy with 20% silicon exhibited oxidation rates less than those associated with alumina scales under similar conditions. The scales which developed upon the Ni-20 silicon alloy are in the process of being identified. It appears that silicon rich coatings have the potential of being used in place of present state-of-the-art MCrAlY coatings. The adherence of alumina formed on alloys of Ni-20Cr-10Al and Co-20Cr-10Al with yttrium or hafnium has been studied by using cyclic oxidation tests, acoustic emission measurements and by measuring the load required to pull scales from substrates. These studies have shown that the following parameters affect alumina scale adherence: oxygen active element type and concentration; base alloy composition (e.g. nickel-versus cobalt-base); alloy surface condition; specimen cooling rate, and exposure time of specimen to oxidation conditions. The acoustic emission technique of studying damage in alumina scales on alloys appears to provide a means of nondestructively determining the useful lives of coatings on alloys that remain after use under service conditions. Author (GRA)

N84-11262# Oak Ridge National Lab., Tenn.

DEVELOPMENT OF MODIFIED 9 Cr-1 Mo STEEL

V. K. Sikka 1982 27 p refs Presented at Workshop on Trends in Critical Mater. Requirements for Steels of the Future Conservation and Substitution Technology for Chromium, Nashville, Tenn., 4 Oct. 1982

(Contract W-7405-eng-26)

(DE83-003450; CONF-821080-2) Avail: NTIS MF A01

The alloy is modified by the additions of niobium (0.06 to 0.10%) and vanadium (0.18 to 0.25%). The alloy is recommended for use in the normalized and tempered condition (1038C for 1 h, air cooled to room temperature; 7600 C for 1 h, air cooled to room temperature). Heat treatment, Cherpy impact, tensile, and creep properties of the alloy are discussed in detail and other properties are described briefly. The ductile to brittle transition temperature (68-J) of modified 9 Cr-1 Mo is lower and the upper shelf energy higher than those of standard 9 Cr-1 Mo alloy. The creep rupture strength of the modified alloy is higher than that of the standard 9 Cr-1 Mo and 2 1/4 Cr-1 Mo steels for the entire creep temperature range. Higher creep strength of the modified 9 Cr-1 Mo steel provides design allowable stresses that exceed those of 2 1/4 Cr-1 Mo and standard 9 Cr-1 Mo steel for the entire temperature range. Operating experience on this alloy is being obtained by installing its tubes in various steam power plants. DOE

N84-11263# Hanford Engineering Development Lab., Richland, Wash.

HYDROGEN TRAPPING BY YTTRIUM IN LOW-TEMPERATURE LITHIUM

R. P. Anantatmula and Hiroji Katsuta 1983 18 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26-28 Apr. 1983

(Contract KE-AC06-76FF-02170)

(DE83-012721; HEDL-SA-2768-FP; CONF-830406-67) Avail: NTIS HC A02/MF A01

A test to determine the lithium compatibility and impurity gettering capabilities of various materials including yttrium was performed in Beryllium-7 Experimental Lithium Loop (7BELL) at 2700C. Yttrium coupons were exposed in liquid lithium for a total of 3718 hours. X-ray diffraction and bulk chemical analysis data indicated that yttrium absorbs hydrogen from liquid lithium at 2700C

and transforms to yttrium dihydride (YH2). The transformation of yttrium to YH2 resulted in embrittlement of the coupons and subsequent fragmentation to small pieces. Additional analysis, based on the equilibrium hydrogen pressures for the transition of yttrium to HY2, and Sievert's relationship for hydrogen in equilibrium with hydrogen in lithium, indicates that the temperature of yttrium cannot exceed 2800C to control the hydrogen concentration in lithium at below 1 wt ppM. DOE

N84-11264# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

TENSILE BEHAVIOR OF THREE COMMERCIAL FERRITIC STEELS AFTER LOW-TEMPERATURE IRRADIATION

R. L. Klueh and J. M. Vitek 1983 9 p refs Presented at the TMS/AIME Topical Conf. on Ferritic Alloys for Use in Nucl. Energy Technol., Snowbird, Utah, 19 Jun. 1983

(Contract W-7405-eng-26)

(DE83-014044; CONF-830659-2) Avail: NTIS HC A02/MF A01

The ferritic (martensitic) steels and the austenitic stainless steels are being considered for use as first wall and blanket structural components for fusion reactors. Tensile specimens of normalized and tempered 9 Cr-1 MoVNb and 12 Cr-1 MoVW steels, normalized and tempered and isothermally annealed 2-1/4 Cr-1 Mo steel, and 20% cold worked type 316 stainless steel were irradiated at approximately 500 C to damage levels of up to about 9 displacements per atom (dpa) in the High Flux Isotope Reactor (HFIR). The preirradiated microstructures of the 9 Cr-1 MoVNb and 12 Cr-1 MoVW steels were a tempered martensite; the microstructure of the normalized and tempered 2-1/4 Cr-1 Mo steel was tempered bainite, and that of the isothermally annealed 2-1/4 Cr-1 Mo steel was primarily polygonal ferrite. DOE

N84-11265# Argonne National Lab., Ill. Office of Fusion Power Program.

SELF-PUMPING IMPURITY CONTROL BY IN-SITU METAL DEPOSITION

J. N. Brooks and R. F. Mattas May 1983 21 p refs

(Contract W-31-109-eng-38)

(DE83-014265; ANL/FPP/TM-174) Avail: NTIS HC A02/MF A01

A system for in situ removal of helium by trapping in freshly deposited metal surface layers of a limiter or diverter was studied. The system would trap helium on a limiter front surface, or a diverter plate, at low plasma edge temperatures, or in a limiter slot region, at high edge temperatures. Fresh material, introduced to the plasma and/or scrape off zone, would be added at a rate of about five times the alpha production rate. The material would be reprocessed periodically, e.g., once year. Possible materials are nickel, vanadium, niobium, and tantalum. Advantages of a self pumping system are the absence of vacuum ducts and pumps, and the minimization of tritium processing and inventory. DOE

N84-11266# Sandia Labs., Albuquerque, N. Mex.

AN EVALUATION OF THE EFFECT OF CELL VOLTAGE AND TERMINATION CURRENT ON BARRIER ANODIC Al2O3 FILM FORMATION

Janda K. G. Panitz, Donald J. Sharp, and F. Edward Martinez May 1983 27 p refs

(Contract DE-AC04-76DP-00789)

(DE83-013961; SAND-830784) Avail: NTIS HC A03/MF A01

The capacitance, breakdown voltage, and leakage current characteristics of barrier anodic films formed on 6061-T6 aluminum alloy at anodization cell potentials ranging from 600 to 950 V, and termination current densities ranging from 5% to 10% of the maximum current density (1mA/sq cm) were observed. The processing times and wet leakage current characteristics were recorded. The electrolyte consisted of a solution of ammonium tartrate in water which was diluted 1:40 with ethanol. Results indicate that leakage current, breakdown voltage, and capacitance vary rapidly as a function of cell voltage and slowly as a function of termination current density. Processing time, however, varies substantially as a function of both cell potential and termination current density. DOE

N84-11267# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

LATTICE-PARAMETER MEASUREMENT IN RETAINED AUSTENITE BY CBED

Mehmet Sarikaya, John W. Steeds (Bristol Univ.), and Gareth Thomas Mar. 1983 6 p refs Presented at the Ann. Meeting of the Electron Microscopy Society of America, Phoenix, Ariz., 6-12 Aug. 1983 Submitted for publication

(Contract DE-AC03-76SF-00098)

(DE83-013296; LBL-15834; CONF-830871-2) Avail: NTIS HC A02/MF A01

Convergent beam electron diffraction (CBED) was used to study the carbon in the thin film retained austenite (ret-gamma) in low-alloy steels. The C content in ret-gamma in 0.5 Mn-0.17 C steel was found to be 1.14 + or - 0.15%, indicating considerable C partitioning into the ret-gamma. DOE

N84-11268# Texas A&M Univ., College Station.

RAREFACTION VELOCITIES IN SHOCKED TANTALUM AND THE HIGH-PRESSURE MELTING POINT

J. M. Brown and J. W. Shaner (LASL) 1983 5 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18-21 Jul. 1983

(Contract W-7405-eng-36; Grant NSF EAR-81-09591)

(DE83-015916; LA-UR-83-2144; CONF-830719-17) Avail: NTIS HC A02/MF A01

The optical analyzer technique was used to determine the pressure at which shock compressed tantalum can no longer support a longitudinal elastic wave. At 295 GPa, the release wave velocity drops to a value consistent with a calculated bulk sound velocity, indicating partial melting. At higher shock pressures, the bulk sound velocity follows a constant rho (BETA) model, where (BETA) is the Grueneisen parameter. With these measurements melting was indentified on the Ta Hugonitot, and Ta calibrated as a high impedance driver for similar experiments on other materials. DOE

N84-11269# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Materials Science and Mineral Engineering.

FATIGUE-CRACK GROWTH BEHAVIOR IN A NITROGEN-STRENGTHENED HIGH-MANGANESE STEEL AT CRYOGENIC TEMPERATURES

R. Ogawa (Kobe Steel, Ltd.) and J. W. Morris, Jr. May 1983 19 p refs Presented at the Metallurgical Soc. Symp. on Fatigue at Low Temp., Louisville, Ky., 10 May 1983

(Contract DE-AC03-76SF-00098)

(DE83-016619; LBL-16024; CONF-8305120-1) Avail: NTIS HC A02/MF A01

The fatigue crack growth rate (FCGR) of a nitrogen-strengthened high manganese stainless steel of nominal composition 18Mn-5Ni-16Cr-0.02C-0.22N was determined in the intermediate stress intensity factor range (20 to 70 MPa m) at 77K and 4K. Fractographic investigations were performed on the fracture surfaces. The FCGR at 4K is very nearly the same as that at 77K and substantially below the crack growth rate for AISI 304LN steel. The fracture surfaces of both the high-manganese alloy and the 304LN showed a transgranular failure mode, but the detailed fractographic features varied with temperature and alloy type. The fractography was closely related to changes in the FCGR. DOE

N84-11270# Pacific Northwest Lab., Richland, Wash.

HYDROGEN EMBRITTLEMENT OF A 12 Cr-1 Mo STEEL

R. H. Jones and M. T. Thomas Jul. 1983 11 p refs Presented at the TMS/AIME Topical Conf. on Ferritic Alloys for Use in Nucl. Energy, Snowbird, Utah, 19-23 Jun. 1983

(Contract DE-AC06-76RL-01830)

(DE83-016781; PNL-SA-10811; CONF-830659-11) Avail: NTIS HC A02/MF A01

The grain boundary phosphorus and sulfur concentrations of HT-9 were found to depend on heat treatment in a manner consistent with other ferritic steels. After a tempering treatment of 2.5 hrs at 7600C, the grain boundary phosphorus and sulfur concentrations were 0.015 and 0.03 monolayers, respectively

while after a heat treatment of 240 hrs at 5400C their grain boundary concentrations were 0.04 and 0.01 monolayers, respectively. Straining electrode tests at cathodic test potentials revealed that HT-9 is sensitive to hydrogen embrittlement with the fracture mode changing from ductile micro-void type fracture in air to a mixed intergranular and quasi-cleavage fracture at cathodic potentials. The reduction of area was 13% at cathodic test potentials and 60% in air. Charpy impact tests revealed a 100C increase in the ductile to brittle transition temperature with heat treatment at 5400C. DOE

N84-11271# Ames Lab., Iowa.
APPARATUS FOR DIRECTIONAL SOLIDIFICATION
John T. Mason Nov. 1982 79 p
(Contract W-7405-eng-82)
(DE83-016409; IS-4817) Avail: NTIS HC A05/MF A01

A detailed description of the construction of an apparatus for the directional solidification of materials under controlled conditions is given. The use of a ball screw, block clamps, and computer driven stepping motor has essentially eliminated adverse frictional and alignment effects of previous designs. The computer interfacing and programming is described. DOE

N84-11272# California Univ., Livermore. Lawrence Livermore Lab.
PLATING ON ALUMINUM: INFLUENCE ON VARYING ZINC IMMERSION TREATMENT TIMES
G. E. Overturf, III and J. W. Dini 18 Jul. 1983 13 p refs Presented at Electroplating Soc. Symp. on Cleaning, Pickling and Etching, Toronto, 27 Sep. 1983
(Contract W-7405-eng-48)
(DE83-015246; UCRL-89604; CONF-8309123-1) Avail: NTIS HC A02/MF A01

Quantitative adhesion data are presented for copper electrodeposits applied to 1100, 6061 and 7075 aluminum alloys. The substrates were prepared for plating by the zinc immersion process. In all cases, a double zinc immersion treatment was used and the time of immersion for the first and second zincate steps was varied. Ring shear tests were used to measure adhesion. DOE

N84-11273# Hanford Engineering Development Lab., Richland, Wash.
LOW ACTIVATION APPROACHES TO MATERIALS DEVELOPMENT Annual Progress Report for period ending Mar. 1983
D. S. Gelles, H. R. Brager, and F. A. Garner Jun. 1983 8 p refs
(Contract DE-AC06-76FF-02170)
(DE83-015972; HEDL-7364; DOE/ER-0045/10) Avail: NTIS HC A02/MF A01

The need for development of low activation alloys is cited. While such development is undertaken as part of Path D (Innovative Materials), it is proposed that portions of this effort proceed in the established Path A (Austenitic) and Path E (Ferritic) programs. The scope of such an effort is similar to that described in Task 1.A.2, to define material property test matrices and test procedures that will provide efficient development of long life and reliable alloys considering time, cost, and test facility constraints. DOE

N84-11274# California Univ., Livermore. Lawrence Livermore Lab.
THEORY OF THE IRON EQUATION OF STATE AND MELTING CURVE TO VERY HIGH PRESSURES
David A. Young and Richard Grover 1983 5 p refs Presented at the Am. Phys. Soc. 1983 Topical Conf. on Shock Waves in Condensed Matter, 18-21 Jul. 1983 Submitted for publication
(Contract W-7405-eng-48)
(DE83-015899; UCRL-89566; CONF-830719-33) Avail: NTIS HC A02/MF A01

A semiempirical equation of state for iron was constructed by dividing the total energy into mean field, interactomic pair potential, and electronic thermal terms. The five adjustable parameters are fitted to the experimental isotherm, Hugoniot, and melting curve. Superimposing the estimated pressure and temperature conditions of the presumably pure solid iron inner core of the Earth onto the calculated phase diagram shows an unexpected discrepancy. DOE

N84-11275# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
SPECIFIC SURFACE MEASUREMENTS OF SHOCK-MODIFIED POWDERS
Y. K. Lee, F. S. Williams, R. A. Graham, and B. Morosin 1983 12 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N.Mex., 18-21 Jul. 1983 Prepared in cooperation with SNL, Albuquerque, N.Mex.
(Contract DE-AC04-76DP-00789)
(DE83-016230; SAND-83-0773C; CONF-830719-37) Avail: NTIS HC A02/MF A01

Inorganic powder samples subjected to controlled shock loading and preserved for post-shock investigation were studied to determine the influence of shock compression on specific surface areas. The BET technique provides a sensitive measure of complex surface areas and when shocked samples are compared to unshocked samples provides a direct indication of shock-induced particle comminution, agglomeration or morphology changes. Low-temperature thermal pretreatment is found to give reliable values and also reveals chemical change at the surfaces. Al2O3 and A1N show relatively modest (20 to 40%) increases in specific surface at low shock pressure with a subsequent decrease on the order of 50% at higher pressure. In contrast, TiC and TiB2 show increases in specific surface up to 75% and 200%, respectively, at the higher pressures. DOE

N84-11276# Sandia Labs., Albuquerque, N. Mex.
CONTROL OF PRECIOUS-METAL PLATING BATHS USING ELECTROGRAVIMETRIC ANALYSIS
William G. Yelton Jul. 1983 15 p
(Contract DE-AC04-76DP-00789)
(DE83-016772; SAND-82-1479) Avail: NTIS HC A02/MF A01

This paper is an outline of an electrogravimetric method for inventory control of precious metal plating baths. The procedure is meant to be applicable to a plating shop environment to provide in-process control. A short review of procedural techniques for sample preparation and analysis is included. The paper deals with the basic how to approach for developing a practical system of analytical control of precious metal electroplating baths permitting accountability of 99% or greater. DOE

N84-11277# California Univ., Livermore. Lawrence Livermore Lab.
HUGONIOT MEASUREMENTS ON UNSINTERED METAL POWDERS
W. H. Gourdin and S. L. Weinland Jul. 1983 5 p refs Presented to the Topical Conf. on Shock Waves in Condensed Matter, Santa Fe, New Mex., 18-21 Jul. 1983 Submitted for publication
(Contract W-7405-eng-48)
(DE83-016364; UCRL-88755; CONF-830719-42) Avail: NTIS HC A02/MF A01

The Hugoniots of unsintered copper, aluminum alloy, and steel powders using carbon gauges were determined. No evidence for an elastic precursor in the specimens as found. The copper and aluminum Hugoniots are well described by models which assume full densification. Complete densification of the steel powder, however, does not occur for stresses less than 3.0 GPa. Although carbon gauges perform well, systematic errors in gauge calibration are observed. DOE

N84-11278# California Univ., Livermore. Lawrence Livermore Lab.
PREDICTION OF MICROSTRUCTURAL MODIFICATION IN DYNAMICALLY CONSOLIDATED METAL POWDERS
W. H. Gourdin Jul. 1983 6 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18-21 Jul. 1983
(Contract W-7405-eng-48)
(DE83-015690; UCRL-88754; CONF-830719-38) Avail: NTIS HC A02/MF A01

A model is presented which describes the deposition of energy at the surface of powder particles during shock-wave consolidation. Solution of the thermal transport equation subject to boundary conditions of constant surface flux yields thermal histories which can be used to predict the type and extent of microstructural modifications following compaction. The application of the model to compacts of several different metal powders is discussed. DOE

N84-11279# California Univ., Livermore. Lawrence Livermore Lab.

THE YIELD STRESS AND STRAIN-RATE SENSITIVITY OF NICKEL OVER A WIDE TEMPERATURE RANGE

M. E. Kassner and K. W. Mahin Jul. 1983 8 p refs

(Contract W-7405-eng-48)

(DE83-016913; UCID-19819) Avail: NTIS HC A08/MF A01

The yield strength of annealed 205 nickel was determined over the temperature range 4 K to 1473 K. The constant structure strain rate sensitivity exponent was also determined. Values of m were determined over the same temperature range as the yield stress. The strain rate sensitivity data are compared against the m values reported for other foc metals. DOE

N84-11280# Pacific Northwest Lab., Richland, Wash.

CORROSION-RESISTANT BEHAVIOR OF AMORPHOUS AND CRYSTALLIZED Fe-Ni-Cr-W ALLOYS

R. Wang Aug. 1983 7 p refs Presented at the 5th Intern. Conf. on Liquid and Amorphous Metals, Los Angeles, 15 Aug. 1983

(Contract DE-AC06-76RL-01830)

(DE83-016815; PNL-SA-11292; CONF-830888-5) Avail: NTIS HC A02/MF A01

The corrosion-resistant behavior of sputter-deposited amorphous and thermally crystallized Fe-Ni-Cr-W alloys was studied in chloride solutions using polarization methods. The amorphous alloys had excellent resistance to pitting in both neutral and acidic solutions. More significantly, the corrosion resistance of the alloys was preserved after heat treatment at the crystallization temperature. This was attributed to a two-stage crystallization process; thus, the amorphous matrix protects the alloy from corrosion of the crystallized phase. DOE

N84-11281# Ruetgerswerke A.G., Frankfurt am Main (West Germany).

ELECTROGRAPHITE ELECTRODES FROM COAL TAR PITCH SUPER NEEDLE COKE FOR ELECTRIC STEEL MANUFACTURING Final Report, Mar. 1981

Herbert Glaser, Rolf Marrett, and Harald Tillmanns (Sigri Elektrographit GmbH) Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 111 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-067; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23,50

Methods of increasing the mechanical strength of graphitized pilot electrodes made of super needle coke from coal tar pitch are discussed. Compared with petrol needle coke, the electrodes from coal tar pitch have better specific electrical resistance values and thermal expansion values, but lower mechanical strength data. Conditions for the economic processing of super needle coke from coal tar pitch are: continuous temperature rising and low final coking temperature; coking process under ambient pressure; low turbulence in the reaction zone; and continuous operation conditions. Results show that it is necessary to adjust the technology of graphite electrode manufacturing. Author (ESA)

N84-11282# Thyssen Stahl A.G., Duisburg (West Germany). Hochofenmetallurgie/Moellervorbereitung.

DEVELOPMENT OF A MULTILAYER PROCESS BASED ON THE DOWN DRAFT PRINCIPLE FOR THE SINTERING OF IRON ORE Final Report, Jun. 1982

Bernhard Gerstenberg, Manfred Riedhammer, Werner Kaas, Rolf-Peter Rosenplaenter, and Dieter Wichmann Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 38 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-065; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,50

A multilayer process for sintering iron ore is described. It uses the oxygen remaining in the process air after permeation of the upper sinter layer to sinter a second lower layer, by depositing a further layer on top of the already ignited mixture layer and by igniting it in an additional furnace. With lower tumbler strength, identical coke consumption is obtained for the one and two-layer sintering process. For the sintering of concentrates, a production increase of 70% is reached compared to the one-layer sintering process, by minimizing the loss of strength to 5% $>$ 6,3 mm for a total layer thickness of 72cm and a maximum of 32.7 tons/sqm/24hr. The increase in fine ore sinter production with 38.2 tons/sqm/24hr is 30% for a layer thickness of 52cm, and a strength loss of 7% $>$ 6,3mm. Author (ESA)

N84-11283# Stahlwerke Peine-Salzgitter A.G. (West Germany). Versuchsanstalt Werk Peine.

WIDE FLANGED BEAMS WITH IMPROVED PROPERTIES Final Report, Dec. 1981

Rama Chandra Swain, Reinhold Hardt, and Wilhelm Bartels Bonn Bundesministerium fuer Forschung und Technologie May 1983 22 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-082; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4,65

Methods to improve the technical properties of wide flanged steel beams are dealt with. Requirements for offshore sites and for civil engineering works in very cold areas are discussed. Wide flanged beams of different chemical compositions were tested in the rolled condition and after normalizing. Heat treatment leads to uniform and improved technical properties, as shown in tensile and impact tests. A microalloyed Nb steel with low carbon, high manganese and cerium shows transition temperatures of -100 C with an impact value of 34 J/sqcm in test sections with 40 mm flange thickness and 320 N/sqmm yield point. Author (ESA)

N84-11284# Max-Planck-Institut fuer Eisenforschung, Duesseldorf (West Germany).

AN INVESTIGATION INTO THERMOMECHANICAL TREATMENT BY ROLLING OF HIGH STRENGTH LOW ALLOY (HSLA) STEELS FOR IMPROVING THEIR MECHANICAL AND TECHNOLOGICAL PROPERTIES Final Report, Dec. 1981

Oskar Pawelski, Radko Kaspar, Lothar Peichl, and Alois Streisselberger Bonn Bundesministerium fuer Forschung und Technologie May 1983 237 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-083; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40,30

A thermomechanical treatment of high strength steel is presented. Some Nb, Ti and Nb-Mo steels were investigated. A hot deformation simulator was used to simulate rolling processes with the plane strain compression test. An anisothermical softening and precipitation as well as microstructure development during the recrystallization and transformation of deformed austenite were studied separately. The simulated schedules of thermomechanical treatment were similar to the plant conditions of hot strip and heavy plate rolling. Author (ESA)

N84-11285# Didier-Werke A.G., Wiesbaden (West Germany).

SINTERING BEHAVIOR OF REFRACTORIES IN THE TERNARY SYSTEM Zr02-Al2O3-Cr2O3 IN DEPENDENCE OF THE FIRING ATMOSPHERE Final Report, Aug. 1982

Hans Leistner and Ingo Elstner Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 31 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer

Forschung und Technologie
(BMFT-FB-T-83-105; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,75

Sintering behaviour of refractories is studied. Improvement of ZrO2- and ZrO2-Al2O2-materials through additions of Cr2O3 was attempted. The Cr2O3 is not easily wetted and increases corrosion resistance, but has a strong tendency to vaporize under oxydizing firing conditions. This causes porosities of > 35 vol -% in materials fired conventionally in oxidizing or neutral atmosphere. Production technology of larger work pieces within the ZrO2-Al2O3-Cr2O3 (ZAC)-system was investigated. The ZAC-materials, fired under extreme reducing atmosphere, have 10 % porosities and high mechanical strength. Corrosion tests establish a direct connection between corrosion resistance and Cr2O3 content. Additions of Cr2O3 increase slag resistance, but give poorer thermal shock resistance. Trials under operating conditions in a steel mill were negative because of the poor thermal shock resistance of the ZAC-dies. Improved thermal shock resistance without changing the physical and chemical properties does not seem feasible. Author (ESA)

N84-11286# Rasselstein Aktiengesellschaft, Neuwied (West Germany). Abt. Anwendungstechnik.
IMPROVEMENT OF MANUFACTURING OF DRAWN AND IRONED STEEL CANS Final Report, Nov. 1981
Manfred Sodeik Bonn Bundesministerium fuer Forschung und Technologie May 1983 26 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-094; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5,50

Manufacturing of steel cans with a reduced amount of material and lower spoilage rates is described. Operating speeds of laboratory lines were similar to those of production lines. Flanging at highly strain hardened can edges with a decreased number of flange cracks is achieved. The parameters influencing the behavior of the can during stripping from the ironing punch were determined so as to reduce damage to the can edge. The lowest possible tin coating on the can outside as a separation between the steel and the tool without the occurrence of galling was determined. Cans with a reduced body wall thickness, using material with a lower tin coating weight were produced. Author (ESA)

N84-11287# Bosch (Robert) G.m.b.H., Stuttgart (West Germany).
HIGH STRENGTH POWDER METAL (PM) STEELS BY LIQUID PHASE SINTERING Final Report, Apr. 1981
Friedrich J. Esper and Gundmar Leuze Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 53 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-139; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11

High strength Fe-Si-P powder metal (PM) steels are described. A method employing concentration gradients of the alloying elements in the powder particles, was developed. Strength values are comparable to those of Fe-Cu-Ni-Mo PM steels. Whereas these alloying elements are so-called strategic raw materials and expensive, phosphorus and silicon are low-priced and readily available. Values of up to 97% of theoretical density are reached and the desired high strength is attained, relatively low sintering temperatures 1150 C result in energy savings. Author (ESA)

N84-11288# Technical Research Centre of Finland, Espoo. Metals Lab.
NOTE ON STANDARDIZATION OF IMPLANT TESTS
Risto Karppi, Jouko Ruusila, Kunihoko Satoh (Osaka Univ.), Masao Toyoda (Osaka Univ.), and Karri Vartiainen May 1983 29 p refs Sponsored by Academy of Finland
(VTT-RR-189; ISBN-951-38-1795-4; ISSN-0358-5077) Avail: NTIS HC A03/MF A01

Four types of implant test specimens were used to study the hydrogen induced cracking of steel weldments. Two types of specimen had a shallow notch with a depth of 0.5 mm but different diameters; one type had a 2 mm deep notch; and one type a helical notch with M6-threads. The specimen with the deep notch has many advantages over specimens having the helical or shallow notch. The advances are mainly seen in mild tests in which hydrogen cracking may occur only at stress levels considerably above the yield stress of the parent metal. The results with the deep notch specimen can, therefore, be applied to real joints welded under high levels of restraint. Author (ESA)

N84-11289# Battelle Columbus Labs., Ohio.
CORROSION OF UNDERGROUND PIPE Final Report
Neil G. Thompson and Kris Kelley Jul. 1983 98 p refs
(PB83-243923; N-3931-001(772); GRI-81/0125) Avail: NTIS HC A05/MF A01 CSCL 11F

Corrosion of underground steel pipe was explored through a literature survey and experimental investigation. The changes in solution parameters which occur during cathodic protection and their effect on corrosion were examined. The variation in pH was closely examined due to the role of pH in producing passive conditions on steel. It was determined that the change in pH of the solution at a steel surface is controlled by the amount of cathodic current applied and the ionic migration of the hydroxyl ions away from the steel surface. The initial pH and the pH of the bulk solution had only minor influence on the final pH attained, and the polarized potential only indirectly affected the final pH. GRA

N84-11290# National Bureau of Standards, Boulder, Colo. Fracture and Deformation Div.
APPLIED J-INTEGRAL IN HY130 TENSILE PANELS AND IMPLICATIONS FOR FITNESS FOR SERVICE ASSESSMENT
D. T. Read Aug. 1982 129 p refs Sponsored in part by the Naval Sea Systems Command
(PB83-240598; NBSIR-82-1670) Avail: NTIS HC A07/MF A01 CSCL 11F

An experimental technique for direct evaluation of the J contour integral is described. Results are reported and discussed. Some fifteen cracked HY130 tensile panels were tested, including center-cracked, single-edge-cracked, double-edge-cracked, face-cracked, and part-through-cracked configurations. As crack size increased, the post-yield deformation pattern changed from gross section yielding, for very small cracks, to net section yielding, for larger cracks. Net section yielding was associated with much larger J-integral values than gross section yielding. Author (GRA)

N84-11291# Bureau of Mines, Washington, D. C. Div. of Ferrous Metals.
PLATINUM-GROUP METALS
J. Roger Loebenstein Jun. 1983 23 p refs
(PB83-239152) Avail: NTIS HC A02/MF A01 CSCL 11F

The platinum group comprises six closely related metals: platinum, palladium, rhodium, ruthenium, iridium, and osmium, which commonly occur together in nature and are among the scarcest of the metallic elements. Together, with gold and silver, they are known as precious or noble metals. They occur as native alloys or mineral compounds in placer deposits, sometimes associated with gold, and in lode deposits where they are commonly associated with nickel and copper. Nearly all of thw world's supply of these metals currently is extracted from loade deposits in three countries the Republic of South Africa, the U.S.S.R., and Canada. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N84-11292# British Library Lending Div., Boston Spa (England).
STUDY OF THE INTERACTION OF ORGANOMAGNESIUM

COMPOUNDS WITH THE SALTS OF HEAVY METALS AND THE USE OF ORGANOMAGNESIUM COMPOUNDS AND THEIR COMPLEXES AS INITIATORS OF POLYMERIZATION

B. L. Erusalimskii, Van Fo-Sun, and A. F. Kavunenko 11 Aug. 1983 7 p refs Transl. into ENGLISH from Intern. Symp. Macromol. Chem. (Moscow), no. 2, 1960 p 355-363

(BLL-M-28720-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Polymerizations catalyzed by Ziegler-type catalysts are discussed with emphasis on the intermediate stages of the interaction of organomagnesium compounds with salts of heavy metals. Of particular interest is the determination of whether free radicals are formed in these reactions, which often lead to the production of catalytic complexes. Topics covered include: (1) reactions of organomagnesium of unsaturated hydrocarbons; and (3) polymerization of isoprene with organomagnesium compounds. Results are tabulated. A.R.H.

N84-11293 Texas Univ., Austin.

A FINITE ELEMENT STUDY OF INSTABILITIES IN RUBBER ELASTICITY Ph.D. Thesis

Trent Harrison Miller 1982 115 p

Avail: Univ. Microfilms Order No. DA8309173

A two dimensional and axisymmetric study of instabilities which may occur during the static analysis of boundary value problems of rubber-like materials was presented. Any material may be used which can be modeled as being isotropic and yperelastic, with the strain energy function given in terms of the principal invariants of the left Gauchy-Green tensor. Finite element formulations are presented for both incompressible and slightly compressible materials. The numerical method uses a modified form of Rik's method to investigate the behavior of bodies past limit points and on bifucation paths. Rik's method was modified to take advantage of the symmetry and bandedness of the tangent stiffness matrix. Six finite element formulations are presented and their behavior studied through the analysis of two problems involving the axial compression of a cylinder. Three additional boundary value problems are investigated to demonstrate,the ability of the numerical method to analyze the post-buckled behavior of a body. Dissert. Abstr.

N84-11294*# Clarkson Coll. of Technology, Potsdam, N.Y.

MATERIAL CHARACTERIZATION OF STRUCTURAL ADHESIVES IN THE LAP SHEAR MODE M.S. Thesis

Steven C. Schenck and Erol Sancaktar Hampton, Va. NASA. Langley Research Center Sep. 1983 88 p refs

(Grant NAG1-284)

(NASA-CR-172237; NAS 1.26:172237) Avail: NTIS HC A05/MF A01 CSCL 11A

A general method for characterizing structural adhesives in the bonded lap shear mode is proposed. Two approaches in the form of semi-empirical and theoretical approaches are used. The semi-empirical approach includes Ludwik's and Zhurkov's equations to describe respectively, the failure stresses in the constant strain rate and constant stress loading modes with the inclusion of the temperature effects. The theoretical approach is used to describe adhesive shear stress-strain behavior with the use of viscoelastic or nonlinear elastic constitutive equations. Three different model adhesives are used in the simple lap shear mode with titanium adherends. These adhesives (one of which was developed at NASA Langley Research Center) are currently considered by NASA for possible aerospace applications. Use of different model adhesives helps in assessment of the generality of the method. Author

N84-11295*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

A REVIEW OF THE USE OF WEAR-RESISTANT COATINGS IN THE CUTTING-TOOL INDUSTRY

J. Salik Nov. 1983 11 p refs Presented at the Intern. Workshop on Industrial Applications of Plasma Chem., Ashkelon, Israel, Apr. 1981

(NASA-TM-83512; NAS 1.15:83512; E-1789) Avail: NTIS HC A02/MF A01 CSCL 11C

The main mechanisms involved in the wear of cutting tools are reviewed. Evaluation of the different coating properties required for the reduction of the different kinds of wear was also reviewed. The types of coatings and their ranges of applicability are presented and discussed in view of their properties. Various coating processes as well as their advantages and shortcomings are described. Potential future developments in the field of wear-resistant coatings are discussed. Author

N84-11296*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

OVERVIEW OF LIQUID LUBRICANTS FOR ADVANCED AIRCRAFT

William R. Loomis 1982 19 p refs Presented at the Symp. on Lubricants for Extreme Environ. at the Joint Lubrication Conf., Washington, D.C., 4-6 Oct. 1982; sponsored by ASME and the American Society of Lubrication Engineers

(NASA-TM-83529; E-1740; NAS 1.15:83529) Avail: NTIS HC A02/MF A01 CSCL 11H

An overall status report on liquid lubricants for use in high-performance turbojet engines is presented. Emphasis is placed on the oxidation and thermal stability requirements imposed upon the lubrication system. A brief history is iven of the development of turbine engine lubricants which led to synthetic oils with their inherent modification advantages. The status and state of development of some nine candidate classes of fluids for use in advanced turbine engines are discussed. Published examples of fundamental studies to obtain a better understanding of the chemistry involved in fluid degradation are reviewed. Also, alternatives to high temperature fluid development are described. The importance of of continuing work on improving high temperature lubricant candidates and encouraging development of fluid base stocks is discussed. S.L.

N84-11297*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

CRYOGENIC INSULATION STRENGTH AND BOND TESTER Patent Application

Paul H. Schuerer, James H. Ehl, and Willibald P. Prasthofer, inventors (to NASA) Filed 3 Nov. 1983 21 p

(NASA-Case-MFS-25910-1; US-Patent-Appl-SN-548582) Avail: NTIS HC A02/MF A01 CSCL 11G

A method and apparatus for testing the tensile strength and bonding strength of sprayed-on foam insulation attached to metal cryogenic fuel tanks is described. A circular cutter is used to cut the insulation down to the surface of the metal tank to form plugs of the insulation for testing 'in situ' on the tank. The apparatus comprises an electromechanical pulling device powered by a belt battery pack. The pulling device comprises a motor driving a mechanical pulling structure comprising a horizontal shaft connected to two bell cracks which are connected to a central member. When the lower end of member is attached to a fitting, which in turn is bonded to a plug, a pulling force is exerted on the plug sufficient to rupture it. The force necessary to rupture the plug or pull it loose is displayed as a digital read-out on screen. NASA

N84-11298# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A METHOD FOR MANUFACTURING A POLYETHER HALOHYDRIN POLYMER AND ITS DERIVATIVES

Tsutomu Toi and Domitsu Sakamoto 15 Jun. 1983 12 p ref Transl. into ENGLISH of Japanese patent no. 48-41720, 7 Dec. 1973 p 211-213

(AD-A130083; FTD-ID(RS)T-0635-83) Avail: NTIS HC A02/MF A01 CSCL 11/9

A method for manufacturing a polyether halohydrin polymer, which is obtained by addition polymerization of epihalohydrin with alcohol molecules, and its derivatives is described. This substance is used as an intermediate for polyester urethane resins and surfactants and as an improving agent and intermediate for cellulose. Its derivatives are used as starting materials, improving agents, and reactivity solvents for epoxy resins, paints and glues,

improving agents and reinforcing agents for synthetic resins and fibers, and as stabilizers for chlorine-containing resins. GRA

N84-11299# Naval Surface Weapons Center, White Oak, Md.
SYNTHESIS OF ENERGETIC MATERIALS Annual Progress Report
H. G. Adolph, W. M. Koppes, D. A. Cichra, and M. Chaykovsky Mar. 1983 46 p refs
(RR0240201)
(AD-A130974) Avail: NTIS HC A03/MF A01 CSCL 07/3

The work described in this report was carried out during 1982 under the sponsorship of the Office of Naval Research, Code 432 (Dr. R. S. Miller). The effort consisted of 2 separate tasks which will be discussed in turn: synthesis of energetic monomers and polymers, and synthesis of polycyclic and adamantoid nitramines. The principal objectives of the work are the synthesis of energetic (nitro) polymers with improved energy and physical properties, and the synthesis of nitramines with high crystal density and energy-density greater than HMX. GRA

N84-11300# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
INTERURETHANE HYDROGEN BONDING IN THERMOPLASTIC POLYURETHANE ELASTOMERS Final Report, 1 Jan. 1977 - 14 Jan. 1983
William J. Macknight Jul. 1983 4 p refs
(Contract DAAG29-80-C-0054; Grant DAAG29-77-G-0055)
(AD-A131368; ARO-14375.1-CH; ARO-16961.3-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

The nature of hydrogen bonding, phase segregation, and hard segment organization was studied in a series of segmented polyurethanes based on hydroxy terminated polybutadiene (HTPBD) soft segments and hard segments consisting of either 2,4- or 2,6-toluene diisocyanate (TDI) and 1,4-butanediol (BDL). GRA

N84-11301# Naval Research Lab., Washington, D. C. Radiation-Matter Interactions Branch.
TEMPERATURE DEPENDENCE OF HYDROLYSIS OF POLYIMIDE WIRE INSULATION Interim Report, 1 Jul. 1982 - 30 Jun. 1983
F. J. Campbell 4 Aug. 1983 26 p refs
(AD-A131334; NRL-MR-5158) Avail: NTIS HC A03/MF A01 CSCL 11/9

Degradation of polymeric materials as a chemical reaction rate to exposure temperature has been confirmed by many laboratory studies and the rate equation enhanced by other stresses and environmental conditions, has been utilized to compare the service life expectancy of various electrical insulation materials and systems for many years. In recent Naval aircraft wiring applications it has been experienced that a popular polyimide insulation undergoes degradation by a hydrolytic chain splitting reaction that can be attributed to an unexpected number of service failures. In this initial study it has been determined that the reaction does proceed in a neutral pH aqueous environment at a rate that is temperature dependent, and the data of life versus temperature conforms to an Arrhenius plot so that from accelerated tests at elevated temperatures it is possible to extrapolate to service temperatures. Continuing studies will lead to the development of a functional aging procedure for applying a moisture exposure step into each cycle in order to more nearly predict service life of this insulation system and provide a comparison with other candidate systems. Author (GRA)

N84-11302# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Macromolecular Science
EPITAXIAL POLYMERIZATION AS A MOLECULAR ENGINEERING TECHNIQUE Final Report, 1 Apr. 1980 - 31 Mar. 1983
Jerome B. Lando and Eric Baer Aug. 1983 11 p
(Contract DAAG29-80-C-0099)
(AD-A131405; ARO-16796.1-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Epitaxial crystallization is the oriented over-growth of a substance on a crystalline substrate. The interaction between the two is usually highly specific and has profound effects on the morphology and structure of the crystallizing material. Epitaxial polymerization is a new phenomenon in the field of macromolecular science. It combines the epitaxial crystallization of a monomer on a crystallization of the monomer. A study of the vapor phase epitaxial polymerization of dissulfurnitride to polythiazyl, (SN)x, resulted in three new crystalline phases of (SN)x, and a new appreciation of the catasphoric effect of water on this polymer. The epitaxial polyermization of hexachlorocyclotriphosphazene to poly(dichlorophosphazene), (NPCl2)x, has been investigated. Deposition from both the vapor phase and solution has been studied. The polymer structure and morphology depend upon the monomer epitaxial crystals. The actual monomer morphology and structure have been found to be dependent of the geometry of the substrate. The application of this method to the epitaxial polymerization of diacetylenes will also be discussed. GRA

N84-11303# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Nonmetallic Materials Div.
MECHANICAL PROPERTIES OF BIS-PHENOL-A POLYSULFONE AND ACETYLENE TERMINATED BIS-PHENOL-A BLEND Final Report, Jun. 1982 - Jan. 1983
J. R. Fried and C. Y.-C. Lee Jun. 1983 37 p refs
(AF PRoj. 2419)
(AD-A131277; AFWAL-TR-83-4036) Avail: NTIS HC A03/MF A01 CSCL 11/9

Torsion Impreganted Cloth Analysis (TICA) has been used as a technique to study the compatibility of two high temperature polysulfone thermoplastics with three acetylene terminated oligomers. Detailed property evaluations were made for blends of bisphenol A polysulfone (PSF) and 4, 4'-(3-ethynlphenoxy)phenyl dimethylmethane (ATB). TICA and DSC measurements have shown the uncured blends to be compatible by the usual criterion of a single composition dependent glass transition over the range of compositions from 0 to 30 wt % ATB. A blend containing 30% ATB was shown to be easily processed at 150 deg C, a temperature more than 100 degrees lower than required to melt fabricate PSF alone. Tensile testing of the molded blends indicated embrittlement and moderate break strength. Nearly total cure of the ATB in these blends could be achieved by heating molded films to higher temperature (e.g., 225 degrees C) for several hours. The curing process apparently leads to phase separation of the PSF component, but results in an overall improvement in tensile properties and suggestion of improved resistance to solvent attack.
Author (GRA)

N84-11304# Sandia Labs., Albuquerque, N. Mex.
ANALYSIS OF SOLDERING-INDUCED CRACKING OF BaTiO3 CERAMIC CAPACITORS
J. A. VanDanAvyle and J. J. Mecholsky 1983 6 p refs Presented at IEEE Intern. Symp. on Appl. of Ferroelec., Gaithersburg, Md., 1 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013980; SAND-82-2979C; CONF-830637-5) Avail: NTIS HC A02/MF A01

Cracks were found in ceramic capacitors after soldering on hydrid microcircuit boards during fabrication. Samples from an older batch of capacitors which were successfully soldered were compared with capacitors from the problem group. X-ray elemental analysis showed differences in chemistries of the barium titanate (BaTiO3) dielectrics, the capacitor plate elements, and the termination and solder layers. Crack initiation sites were found along the outer surfaces originating at the metal/ceramic interface; in many cases crack growth from an initial flaw occurred in discrete steps. The fractographic evidence indicated that thermal stress at the metal/ceramic interface was driving force for the crack propagation. These stresses could have originated at several times: during the original manufacture of the capacitors, the reflow board soldering process, or subsequent reworking operations. Fracture toughness and hardness measurements were made from cracks and impressions, respectively, of a Vickers pyramid diamond. DOE

N84-11305# McElroy (Ralph) Co., Austin, Tex.
ELECTROACTIVE HETEROCYCLIC POLYMERS
Yoram S. Papir 1983 59 p Transl. into ENGLISH of French Patent no. 2,505,854 (Appl. no. 82 08557, 17 May 1982)
(Contract W-7405-eng-36)
(DE83-013592; LA-tr-83-10) Avail: NTIS HC A04/MF A01

It is desired to have workable organic polymers with an electric conductivity that can be varied over a wide range, from the insulating state of the unmodified polymer to the metallic state, passing through the semiconductor state. This modification is effected by means of electron acceptor or donor dopants. Electroactive polymers of the n- and p-type can be produced in this way. The polymers comprise units of repeating divalent radicals derived from systems of 6-membered condensed rings containing nitrogen, where each ring contains no more than three nitrogen atoms connected in sequence. Examples are quinoline, isoguinoline, cinnoline, quinazoline, and 1,2,3-benzotriazine. DOE

N84-11306# Los Alamos Scientific Lab., N. Mex.
ORGANOTIN PIEZO- AND PYROELECTRIC POLYMER FILMS
R. Liepins, M. L. Timmons (Research Triangle Inst.), N. Morosoff (Research Triangle Inst.), and J. Surles (North Carolina Univ., Chapel Hill) 1983 18 p refs Presented at the 186th Natl. Meeting of the American Chemical Society, Washington, D.C., 29 Aug. - 2 Sep. 1983
(Contract W-7405-eng-36)
(DE83-009903; LA-UR-83-949; CONF-830814-1) Avail: NTIS HC A02/MF A01

The synthesis of a class of piezo- and pyroelectrically active materials of various co- and terpolymers of tributylin methacrylate (TBTM) and trimethyltin methacrylate (TMTM) is described. Sample preparation, poling techniques, and the measurement system are detailed. Films of the various polymer compositions were evaluated for tin current, glass transition temperature (Tg), crystallinity or ordering of the amorphous phase and piezo- and pyroelectric activity. Experimental results on 25 to 30 mol% TBTM/methyl methacrylate copolymers, which possessed good piezoelectric activity, antifouling properties and paint-formulation characteristics, are discussed. Solvent-induced orientation effects that lead to piezoelectric activity in amorphous, unpoled, polymers are also considered. DOE

N84-11307# Argonne National Lab., Ill. Materials Science and Technology Div.
COMPARISON OF THE CALCULATED PROPERTIES OF HIGH-ANGLE (001) TWIST BOUNDARIES IN MnO, FeO, CoO AND NiO WITH MgO
Dieter Wolf 1983 32 p refs Presented at the Symp. on Struct.-Property Relationships for MgO and Al/sub 2/O/sub 3/ ceramics, Cambridge, Mass., 13 Jun. 1983
(Contract W-31-109-eng-38)
(DE83-015677; CONF-8306105-1) Avail: NTIS HC A03/MF A01

The energy and structure of 001 coincident-site lattice twist grain boundaries and of the free 001 surface in the transition metal oxides with rocksalt structure (MnO, FeO, CoO, and NiO) is determined by means of a computer code. Boundaries with values of (UC OMEGA), the inverse density of coincidence sites, ranging between 5 and 65 are considered. Comparison with similar results for MgO confirms earlier suggestion that the effective Van-der-Waals attraction between oxygen ions on opposite sides of the interface is mainly responsible for the rather weak cohesion of these bicrystals. Coulombic interactions are thought to play a minor role only. As for MgO, the comparison of the relaxed energies, E/sub (UC OMEGA)/, of boundaries characterized by different values of (UC OMEGA) and the misfit angle theta suggests that no special boundaries (giving rise to so-called cusps in the E/sub (UC OMEGA)/ (theta) curve) exist on 001 planes in the NaCl structure. DOE

N84-11308# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
LIGHT-SCATTERING STUDIES OF SILICA AEROGELS
Arlon J. Hunt Feb. 1983 15 p refs Presented at the Intern. Conf. on Ultrastructure Processing of Ceramics, Glasses and Composites, Gainesville, Fla., 13-17 Feb. 1983
(Contract DE-AC03-76SF-00098)
(DE83-015412; LBL-15756; CONF-830215-3) Avail: NTIS HC A02/MF A01

Due to its combination of transparency and low thermal conductivity, aerogel holds considerable promise for use as insulating window materials for residential and commercial applications. The optical and scattering properties of silica aerogels are discussed. The properties of aerogels important for window glazing applications are described. The optical properties are then described, followed by a discussion of the scattering measurements and their interpretation. DOE

N84-11309# Los Alamos Scientific Lab., N. Mex.
KINETICS OF STRUCTURAL RELAXATION IN METALLIC GLASSES
J. R. Cost and J. T. Stanley 1983 7 p refs Presented at the 5th Intern. Conf. on Liquid and Amorphous Metals, Los Angeles, 15 Aug. 1983
(Contract W-7405-eng-36)
(DE83-015924; LA-UR-83-2254; CONF-830888-4) Avail: NTIS HC A02/MF A01

When a metallic glass is annealed at temperatures below the glass transition temperature its structure changes with time. This structural change is observed to have an irreversible component and a reversible component. The reversible component is called chemical short range order (CSRO) and the irreversible components topological short range order (TSRO). It is believed important to determine if the spectrum of relaxation times has fine structure. Experiments were carried out to obtain the maximum possible detail about the kinetic behavior of the CSRO changes. Also a new method of analysis of the response curve, referred to as direct spectrum analysis, was used to resolve fine structure in the spectrum of relaxation times. DOE

N84-11310# Sandia Labs., Albuquerque, N. Mex.
POLYIMIDES FOR USE IN INTEGRATED CIRCUITS
W. K. Schubert May 1983 28 p refs
(Contract DE-AC01-80PE-70039)
(DE83-016769; SAND-83-0641) Avail: NTIS HC A03/MF A01

The primary experiments carried out were capacitance-voltage measurements, bias-temperature stress testing and current-voltage measuremens as a function of temperature. Bias-temperature stressing causes significant charging in metal-polyide-silicon dioxide-Silicon capacitors. The mechanism involved is apparently high temperature electron transport in the polyimide and subsequent trapping at the polyimide-SiO2 interface. The specific conduction mechanisms in polyimide are quite complex and remain unspecified. Considerable variability in the electrical characteristics from sample to sample was also observed. These results indicate serious problems which must be dealt with if polyimides are to be used in integrated circuits. DOE

N84-11311# Sandia Labs., Albuquerque, N. Mex.
ORIGIN OF PYROELECTRICITY IN POLYVINILYDENE FLUORIDE
R. G. Kepler, R. A. Anderson, and R. R. Lagasse 1983 17 p refs Presented at the US/Japan Seminar on Piezoelec. Polymers, Honolulu, Hawaii, 17 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-015227; SAND-83-1592C; CONF-830784-1) Avail: NTIS HC A02/MF A01

The experimental observations indicate that reversible changes in crystallinity contribute significantly to the magnitude of the pyroelectric effect. DOE

N84-11312# Sandia Labs., Albuquerque, N. Mex.
DIELECTRIC BREAKDOWN OF MXB-71 PHENOLIC AND SYLGARD 184/GMB SILICONE AT HIGH TEMPERATURE
R. T. Johnson, Jr. and P. M. Beeson Jul. 1983 17 p refs
(Contract DE-AC04-76DP-00789)
(DE83-016768; SAND-83-1244) Avail: NTIS HC A02/MF A01

High temperature electrical breakdown characteristics were determined for MXB-71 phenolic and Sylgard 184/GMB silicone in air and nitrogen environments. The phenolic material is used for electronic case housings whereas the silicone is an encapsulant. The experiments were performed with constant electric fields (values ranging from 3,000 to 25,000 v/cm) applied to the samples while the temperature was increased at a rate of 100 C/minute. The sample current until breakdown was determined. Results showed that breakdown occurred between 470 to 7250 C, and was principally dependent upon the material conductivity at time breakdown and the electric field. The breakdown temperature decreased with increasing electric field and decreased in an oxygen containing environment. Materials postcured at 580 to 6000 C prior to electrical testing exhibited considerably lower breakdown temperatures at higher electric fields. Results suggest that breakdown occurred via thermal runaway. DOE

N84-11313# Oak Ridge National Lab., Tenn.
STRUCTURE-PROPERTY RELATIONSHIPS IN ION-IMPLANTED CERAMICS
C. J. McHargue, B. R. Appleton, and C. W. White 1983 15 p refs Presented at the NATO Advanced Study Inst. on Surface Eng., Les Arcs, France, 3 Jul. 1983
(Contract W-7405-eng-26)
(DE83-015505; CONF-830787-1) Avail: NTIS HC A02/MF A01

The structure of ceramic surfaces can be altered by ion implantation to yield surface hardnesses that are greater than or less than that of the virgin material. Control of the resultant structure by variation of ion species, implantation temperature, and post-implantation heat treatment allows one to obtain a specific set of properties within this envelope. Studies on Al2O3, SiC, and TiB2 are summarized. DOE

N84-11314# Fritz-Haber-Institut, Max-Planck-Gesellschaft, Berlin-Dahlem (West Germany).
THE DEVELOPMENT AND STUDY OF SENSITIVE AND PROCESS-COMPATIBLE POLYMERS FOR X-RAY LITHOGRAPHY Final Report, Dec. 1981
Frithjof Asmussen, Hideto Sotobayashi, and Wolfram Schnabel (Hahn-Meitner-Inst.) Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 59 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-122; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,50

Polymer resists for X-ray lithography are studied. Some X-ray resists of fluorine-containing copolymers were produced, which with high sensitivity (64 mJ/sqcm) and large contrast (7.3), also have good adherence. Copolymers of methylmethacrylate and methacrylyl chloride have clear advantages as X-ray resists over PMMA, if they are stored and handled under controlled conditions. Poly (hexene-sulfone) and Poly (methylpentene-sulfone) were synthesized, and under certain conditions are suitable X-ray resists for dry development. A negative acting resist was produced with a PMMA copolymer as a basis, which through excitation by high energy radiation and the presence of a multifunctional crosslinking agent builds an indissoluble network. The influence of chemical radiation decomposition of main chains and side groups on the kinetics of solution of a polymer was investigated. Author (ESA)

N84-11315 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Zentrallabor.
INVESTIGATION ON THE OXIDE LAYER OF ALUMINIUM WITH RESPECT TO ADHESIVE BONDING
F. Nitschke and H. Franz Dec. 1982 18 p Presented at SCADEG/UKESUG meeting, Erperheide, Belgium, 21-23 Apr. 1982
(MBB-BB-530-82-OE) Avail: Issuing Activity

Aluminum pretreatments used in the aerospace industry (chromic acid anozide (CMA), phosphoric acid anodize (PAA) and pickling) for adhesive bonding were compared using surface analytical techniques. The CAA produces an oxide layer 4000 nm thick, PAA 250 nm and pickling 10 nm. The CAA oxide is very pure, the others contain traces of sulfur of phosphorous. All pretreatments give good initial adhesivity, but are sensitive to humidity. If the oxide is covered by the adhesive, oxide thickness increases by 10 nm, but it is not known if hydrolysis occurs. Salt spray tests on bonded strips indicate that most of the failure leading to separation occurs in the adhesive. Author (ESA)

N84-11316# Washington Univ., St. Louis, Mo. Materials Research Lab.
STRUCTURE AND PROPERTIES OF POLYETHYLENE Annual Report, Jan. - Dec. 1982
J. L. Kardos, R. L. Powell, and K. L. Jerina Jun. 1983 56 p refs
(PB83-243931; GRI-81/0142) Avail: NTIS HC A04/MF A01 CSCL 11I

The mechanical properties of oriented polyethylene solids such as gas pipe were predicted. Processing conditions necessary to produce superior performance properties in such pipe were identified. GRA

N84-11317# National Bureau of Standards, Washington, D.C.
RELATIONSHIP BETWEEN MORPHOLOGY AND MECHANICAL PROPERTIES OF ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE Annual Report, 1 Oct. 1981 - 30 Sep. 1982
J. M. Crissman, L. J. Zapas, and F. A. Khoury May 1983 40 p refs
(PB83-240960; NBSIR-83-2696-FDA; AR-3) Avail: NTIS HC A03/MF A01 CSCL 11I

The morphology and mechanical properties of ultra high molecular weight polyethylene (UHMWPE) were studied. The two principle areas of investigation were: (1) the examination by X-ray diffraction of morphological changes occurring in UHMWPE while under strain, and (2) the creep and recovery behavior of UHMWPE at small deformations. A one dimensional constitutive equation is presented which describes the creep and recovery behavior of this material at small deformations. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N84-11318*# Aerojet Liquid Rocket Co., Sacramento, Calif.
COMBUSTION PERFORMANCE AND HEAT TRANSFER CHARACTERIZATION OF LOX/HYDROCARBON TYPE PROPELLANTS, VOLUME 2 Final Report
L. Schoenman Sep. 1983 291 p refs
(Contract NAS9-15958)
(NASA-CR-171714; NAS 1.26:171714;
Rept-15958T-1548-MA-129T-003F) Avail: NTIS HC A13/MF A01 CSCL 21I

A data base which relates candidate design variables, such as injector type, acoustic cavity configuration, chamber length, fuel film-cooling, etc., to operational characteristics such as combustion efficiency, combustion stability, carbon deposition, and chamber gas-side heat flux was generated. Author

N84-11319*# Aerojet Liquid Rocket Co., Sacramento, Calif.
COMBUSTION PERFORMANCE AND HEAT TRANSFER CHARACTERIZATION OF LOX/HYDROCARBON TYPE PROPELLANTS, VOLUME 1 Final Report
R. W. Michel Apr. 1983 142 p refs
(Contract NAS9-15958)
(NASA-CR-171713; NAS 1.26:171713;
Rept-15958-MA-129T-003F-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 21I

A program to evaluate liquid oxygen and various hydrocarbon fuel as low cost alternative propellants suitable for future space transportation system applications is discussed. The emphasis of

the program is directed toward low earth orbit maneuvering engine and reaction control engine systems. The feasibility of regeneratively cooling an orbit maneuvering thruster was analytically determined over a range of operating conditions from 100 to 1000 psia chamber pressure and 1000 to 10,000-1bF thrust, and specific design points were analyzed in detail for propane, methane, RP-1, ammonia, and ethanol; similar design point studies were performed for a filmcooled reaction control thruster. Heat transfer characteristics of propate were experimentally evaluated in heated tube tests. Forced convection heat transfer coefficients were determined over the range of fluid conditions encompassed by 450 to 1800 psia, -250 to +250 F, and 50 to 150 ft/sec, with wall temperatures from ambient to 1200 F. Seventy-seven hot firing tests were conducted with LOX/propane and LOC/ethanol, for a total duration of nearly 1400 seconds, using both heat sink and water-cooled calorimetric chambers. R.J.F.

N84-11320# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PREPARATION OF ANHYDROUS HYDRAZINE [PREPARACAO DE HIDRAZINA ANIDRA]
Isabel Cristina Coelho Calegao and Antonio Goncalves deFreitas Jul. 1983 8 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Ann. Meeting of SBPC, Belem-Pa., Brazil, 6-13 Jul. 1983
(INPE-2806-PRE/366) Avail: NTIS HC A02/MF A01

The process of anhydrous hydrazine preparation from dehydration of the commercially available monohydrate is described. In a laboratory scale, hydrazine, at a level higher than 985, was obtained. The production goal is 10 kg/day. Catalytic decomposition of anhydrous hydrazine is utilized in micropropulsion with the objective of controlling orbit and attitude of satellites. S.L.

N84-11321# Naval Research Lab., Washington, D. C. Combustion and Fuels Branch.
A STATISTICAL EXAMINATION OF THE EFFECT OF COMPOSITION ON THE FREEZING POINTS OF HYDRO-CARBON MIXTURES Interim Report
W. A. Affens, R. N. Hazlett, and D. E. Smith 21 Jul. 1983 16 p refs
(AD-A131000; NRL-8692) Avail: NTIS HC A02/MF A01 CSCL 21/4

A series of three statistically designed experiments was run to study the effect of composition on the freezing point of model hydrocarbon fuels. For each experiment, regression equations were derived to describe the effect of composition on freezing point for various mixtures of n-alkanes and other hydrocarbons. These experiments showed that the higher n-alkanes and the interactions among them play an important role in freezing point. The n-alkanes C-16, C-15, and C-14 (in that order) had a strong positive effect (raised the freezing point). The n-alkanes C-12 and C-13 also had strong effects, with C-12 and C-13 in combination showing strong negative effects. However, the magnitude and direction (positive or negative) of the C-12 and C-13 effects (individually and in combination) were greatly dependent on the concentration of C-16. In general C-12 and C-13 individually had a positive effect when the C-16 mole fraction as small (less than 1.67 mol-%) but a negative effect in the presence of higher C-16 concentrations. The n-alkanes C-10 and C-11 had negligible effects. These behaviors were consistent with the results of previous NRL studies. GRA

N84-11322# Naval Surface Weapons Center, White Oak, Md.
SYNTHESIS AND PROPERTIES OF TRISUBSTITUTED TRINITROBENZENES. TATB ANALOGS
Michael Chaykovsky and Horst G. Adolph Mar. 1983 26 p refs
(AD-A131619; AD-F500192; NSWC/TR-83-22) Avail: NTIS HC A03/MF A01 CSCL 19/1

A series of trisubstituted trinitrobenzene derivatives structurally related to tatb, with diversified physical properties, were synthesized and evaluated with respect to stability, impact sensitivity, and density. Several compounds showed improved sensitivity-performance characteristics relative to standard explosives. GRA

N84-11323# Ballistic Research Labs., Aberdeen Proving Ground, Md. Ballistic Research Lab.
TRANSIENT COMBUSTION: MODELS VERSUS ONERA DATA Final Report
Carl W. Nelson Jun. 1983 33 p refs
(DA Proj. 1L1-61102-AH-43)
(AD-A131151; AD-F300284; ARBRL-TR-02499) Avail: NTIS HC A03/MF A01 CSCL 21/2

Models of transient combustion of solid propellants were used to try to reproduce transient regression rates measured in experiments at ONERA (French space agency). Variations of the thermal theory approach could not reproduce the measured rates with Reasonable assignment of unmeasurable parameters in the models. Attempts were made with the Kooker-Zinn, Zeldovich, and flame sheet approaches to the gas phase heat feedback. Calculated transients were smaller than the measurements. Predictions of very steep runaway transients were shown to be either a linearly unstable initial condition, or unreproducible by any method. GRA

N84-11324# Geo-Centers, Inc., Newton, Mass.
CHARACTERIZATION OF HYDROXYLAMMONIUM NITRATE (HAN) AT VARIOUS PRESSURES AND TEMPERATURES
C. A. VanDijk May 1983 31 p refs
(Contract N00014-82-C-2150)
(AD-A131574; GC-TR-83-266) Avail: NTIS HC A03/MF A01

A summary of some characteristics of various liquid propellants has been given by Klein. In the present report, attention is focused on hydroxylammonium nitrate, which is the more important component in HAN-based propellants. Under ambient conditions, this salt can be dissolved in H2O up to 95% by weight. The concentration most often used in the present report is 11 molar (73.6%). Both ions of HAN are oxygen-rich and therefore the predominant mode of reaction with most other compounds is oxidation (1). Although HAN is a propellant by itself, the fuel component isopropylammonium nitrate (IPAN) is often used in a mixture under various conditions. Slow reaction sequences were also monitored using Raman spectroscopy. To obtain the spectral assignments, the sample was contained in a glass capillary tube. The Raman spectrum of various related compounds, such as ammonium nitrate, was also obtained for reference purposes.GRA

N84-11325# California Univ., Berkeley. Lawrence Berkeley Lab.
CATALYSED LOW-TEMPERATURE PRODUCTION OF METHANE FROM WATER AND GRAPHITE
F. Delannay, W. T. Tysoe, H. Heinemann, and G. A. Somorjai Mar. 1983 6 p refs Presented at Intern. Conf. on Coal Sci., Pittsburgh, 15 Aug. 1983
(Contract DE-AC03-76SF-00098)
(DE83-012474; LBL-15859; CONF-830807-7) Avail: NTIS HC A02/MF A01

A detailed analysis of the conditions of formation of the reaction products, including H2 and higher hydrocarbons together with methane, from the reaction between water and graphite in the presence of KOH. The reaction, that eventually deactivates, can be thermally regenerated. The reaction of water vapor + KOH at 800K produces predominantly hydrogen along with methane and other hydrocarbons up to C6. This reaction eventually deactives. Heating the sample to 1300 K evolves CO and hence it is probable that the species rsponsible for deactivation contains an oxidized carbon. At higher temperature, alkalis are known to be catalysts for the reaction between water and carbon. Since thermal decomposition of the oxidized species results in restoring part of the activity of the sample, this species is probably also an intermediate for the reaction at high temperature. In such conditions, this intermediate presumably decomposes so as to maintain the catalyst activity whereas below 800K this intermediate merely accumulates on the graphite surface. DOE

N84-11326# Fluke Inst. for Renewable Energy, Bellevue, Wash.
ETHYL ALCOHOL FUEL PRODUCTION FROM THE JERUSALEM ARTICHOKE Final Report
Paul R. Middaugh Mar. 1983 34 p refs

(Contract DE-FG07-81ID-12327)
(DE83-013488; DOE/ID-12327/T1) Avail: NTIS HC A03/MF A01

The commercial feasibility for production of fuel alcohol by fermentation of the carbohydrates in the tops of the Jerusalem artichoke is evaluated. The maximum top biomass yields of the mammoth French white variety of Jerusalem artichoke was obtained at 119 days after plant emergence and maximum fresh weight of the tops was 31.6 tons per acre. Single versus multiple cuttings demonstrated the maximum carbohydrate was obtained with a single harvest of the mature plants immediately following bud formation. The total carbohydrate yield from the top biomass was 1.26 tons per acre. The equivalent yield of fermentation alcohol is 180.6 gallons of anhydrous athanol per acre. The tuber yield at both mesa and Toppenish, WA, was 14 to 15 tons of fresh tubers with 18% total carbohydrates. The carbohydrate yield was 2.52 tons per acre. This is equivalent to a yield of 360 gallons of anhydrous ethanol per acre. The steps for commercial processing of the biomass tops and tubers is discussed including extracting and fermentation of the carbohydrates to ethanol and their concentration by distillation and dehydration by molecular sieves to anhydrous fuel alcohol. The economic feasibility and energy requirements for commercial processing are discussed. DOE

N84-11327# Utah Univ., Salt Lake City. Dept. of Bioengineering.
TECHNICAL AND ECONOMIC STUDY OF ETHANOL DISTILLATION FROM LOW TEMPERATURE SOURCES Final Report, 23 Jun. 1981 - 22 Nov. 1982
Steven A. Johnson Mar. 1983 68 p
(Contract DE-FG07-81ID-12337)
(DE83-013073; DOE/ID-12337/T1) Avail: NTIS HC A04/MF A01

Some objectives of this project are investigate the thermodynamics, mass transport, column contact efficiencies, and other operating characteristics of a distillation column operated with CO2 carrier gas and with water absorption to remove alcohol vapor from recirculated CO2, to facilitate operation at lower temperatures, and to study the economics of constructing a commercial-size ethanol distillation plant. Data indicate that the distillation column was operated successfully at several feed temperatures and several ethanol feed concentrations as well as under a wide range of CO2 flow rates, temperatures, feed flow rates, and ethanol feed concentrations. No detectable difference was found in the concentration of ethanol in the distillate product when N2 or CO2 carrier gas was used. Results of the economic study indicate that the use of carrier gas is shown to cause an increase in cost in the stripper and the rectifier sections. The CO2 causes a loss in the rectifier section which is significant. DOE

N84-11328# Brookhaven National Lab., Upton, N. Y.
CHEMICAL/HYDROGEN ENERGY SYSTEMS Annual Report, 1 Jan. - 31 Dec. 1982
May 1983 117 p refs
(Contract DE-AC02-76CH-00016)
(DE83-012145; BNL-51652) Avail: NTIS HC A06/MF A01

Activities carried out in 1982 within the Chemical/Hydrogen Energy Systems Program for which Brookhaven National Laboratory (BNL) provides technical and management support to the US department of Energy are described. Progress made by private sector contractors, university researchers, and BNL in-house technical staff is summarized for work in electrolytic hydrogen production, hydrogen storage systems, materials and end use, chemical energy storage/recovery systems, and chemical heat pumps. Federal guidelines and budgetary allocations are reflected in BNL R and D planning and implementation, where emphasis is placed on conversion, storage, and transport of far-term primary energy resources via hydrogen base technology, depolarization mechanism, and novel systems which permit the electrolysis of sea water without pretreatment. R and D originally planned for the near-to-midterm is being brought to an orderly close. The completion of the design, fabrication, and test of a prototype industrial chemical heat pump illustrates typical projects brought to the point of technology transfer to the private sector interested in pursuing commercialization. Included are a summary of related International Energy Agency cooperative efforts as well as plans and funding projections for future years. DOE

N84-11329# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ETHANOL FUELS REFERENCE GUIDE: A DECISION-MAKERS GUIDE TO ETHANOL FUELS
Oct. 1982 254 p refs
(Contract DE-AC02-77CH-00178)
(DE83-014401; SERI/SP-451-442) Avail: NTIS HC A12/MF A01

This guide is a compendium of information on alcohol fuel production and use is presented. Facts about ethanol are given; basic questions about gasohol are answered; feedstocks and their coproducts; ethanol production processes; and vehicle fuel use and performance are discussed. In addition, there are 8 appendices which include fermentation guides for common grains and potatoes, component and enzyme manufacturers, and information on regulations and permits. DOE

N84-11330# Sandia Labs., Albuquerque, N. Mex.
VELOCITY INTERFEROMETER SYSTEM FOR ANY REFLECTOR (VISAR): STUDIES OF WAVE GROWTH IN GRANULAR EXPLOSIVES
Robert E. Setchell 1983 6 p refs Presented at the 27th Ann. Intern. Tech. Symp. on High Speed Phot., Videography and Photonics, San Diego, Calif., 21 Aug. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013772; SAND-83-0938C; CONF-830874-3) Avail: NTIS HC A02/MF A01

VISAR detonation was used to examine how compressive waves grow towards detonation in granular explosives. In the experiments, a variety of initial waveforms were generated in explosive samples using planar impact techniques and carefully designed projectile and target assemblies. Despite limitations due to window inerfaces, VISAR measurements provided important insights into initiation processes, and contributed to a useful data base for the evaluation of predictive models. DOE

N84-11331# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
EXPERIMENTAL HYDROGEN-FUELED AUTOMOTIVE ENGINE DESIGN DATA-BASE PROJECT, VOLUME 1 Executive Summary Report
M. R. Swain, R. R. Adt, Jr., and J. M. Pappas (Hawthorne Research and Testing, Inc., Miami, Fla.) May 1983 24 p refs 3 Vol.
(Contract DE-AC03-77CS-51212)
(DE83-017023; DOE/CS-51212/1-Vol-1) Avail: NTIS HC A02/MF A01

A preliminary hydrogen fueled automotive piston engine design data base is overviewed. The effort encompassed the testing of 19 different configurations of an appropriately modified, 1.6 liter displacement, light duty automotive piston engine. The design data base includes engine performance and exhaust emissions over the entire load range, generally at a fixed speed (1800 rpm) and best efficiency spark timing. This range was sometimes limited by intake manifold backfiring and lean limit restrictions; however, effective measures were demonstrated for obviating these problems. High efficiency, competitive specific power, and low emissions were conclusively demonstrated. DOE

N84-11332# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
EXPERIMENTAL HYDROGEN-FUELED AUTOMOTIVE ENGINE DESIGN DATA-BASE PROJECT. VOLUME 2: MAIN TECHNICAL REPORT
M. R. Swain, R. R. Adt, Jr., and J. M. Pappas (Hawthorne Research and Testing, Inc., Miami, Fla.) May 1983 287 p refs 3 Vol.
(Contract DE-AC03-77CS-51212)
(DE83-017025; DOE/CS-51212/1-Vol-2) Avail: NTIS HC A13/MF A01

Operational performance and emissions characteristics of

hydrogen fueled engines are reviewed. The project activities are reviewed including descriptions of the test engine and its components, the test apparatus, experimental techniques, experiments performed and the results obtained. Analyses of other hydrogen engine project data are also presented and compared with the results of the present effort. DOE

N84-11333# Oak Ridge National Lab., Tenn. Bioprocess Research Group.
IMMOBILIZED CHLOROPLAST-FERREDOXIN-HYDROGENASE SYSTEM FOR THE SIMULTANEOUS PHOTOPRODUCTION OF HYDROGEN AND OXYGEN
Jonathan Woodward and Elias Greenbaum 1983 15 p refs Presented at the 5th Symp. on Biotechnol. for fuels and Chemicals, Gatlinburg, Tenn., 10 May 1983 Submitted for publication
(Contract W-7405-eng-26)
(DE83-015703; CONF-830567-3) Avail: NTIS HC A02/MF A01

The chloroplast-ferredoxin-hydrogenase (CFH) system is capable of the simulataneous photoproduction of hydrogen and oxygen using water as the source of electrons. The immobilization of chloroplasts and hydrogenase was attempted in order to increase their storage and functional stability. The simultaneous photoproduction of hydrogen and oxygen is a valuable guide in assessing the role of water as the primary substrate in biophotolysis. The stoichiometric ratio of hydrogen to oxygen is, in general, not equal to two. By measuring the oxygen that is produced along with the hydrogen, it is possible to set an upper limit on the photoproduced hydrogen that is derived from water. The simultaneous photoproduction of hydrogen and oxygen by the CFH system immobilized in calcium alginate gel spheres is described. DOE

N84-11334# California Univ., Livermore. Lawrence Livermore Lab.
OLD EXPLOSIVES FACILITIES NEED LOVE (SAFETY ANALYSES) TOO
Byron N. Odell 15 Jul. 1983 8 p Presented at the 6th Intern. System Safety conf., Houston, 26-30 Sep. 1983
(Contract W-7405-eng-48)
(DE83-014447; UCRL-88912; CONF-8309115-1) Avail: NTIS HC A02/MF A01

Several reasons why existing explosive test facilities need current safety analyses and how these analyses are performed are given. A history of the test site, a discussion of a typical explosives experiment, and a summary of the various hazards involved plus major concerns and findings are included. Followed by a discussion on how the safety analyses reports are written and approved and how the recommendations are incorporated. DOE

N84-11335*# Aerojet Liquid Rocket Co., Sacramento, Calif.
COMBUSTION PERFORMANCE AND HEAT TRANSFER CHARACTERIZATION OF LOX/HYDROCARBON TYPE PROPELLANTS Final Summary Report
R. W. Michel Sep. 1983 42 p refs
(Contract NAS9-15958)
(NASA-CR-171712; NAS 1.26:171712;
Rept-15958-T-1548-262T-0045) Avail: NTIS HC A03/MF A01 CSCL 21I

An evaluation liquid oxygen (LOX) and various hydrocarbon fuels as low cost alternative propellants suitable for future space transportation system applications was done. The emphasis was directed toward low earth orbit maneuvering engine and reaction control engine systems. The feasibility of regeneratively cooling an orbit maneuvering thruster was analytically determined over a range of operating conditions from 100 to 1000 psia chamber pressure and 1000 to 10,000-1bF thrust, and specific design points were analyzed in detail for propane, methane, RP-1, ammonia, and ethanol; similar design point studies were performed for a film-cooled reaction control thruster. Heat transfer characteristics of propane were experimentally evaluated in heated tube tests. Forced convection heat transfer coefficients were determined. Seventy-seven hot firing tests were conducted with LOX/propane and LOX/ethanol, for a total duration of nearly 1400 seconds, using both heat sink and water-cooled calorimetric chambers. Combustion performance and stability and gas-side heat transfer characteristics were evaluated. R.J.F.

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N84-11336# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENTIFIC AFFAIRS, NO. 789
28 Sep. 1983 26 p refs Transl. into ENGLISH from various East European articles
(JPRS-84426) Avail: NTIS HC A03

Programming M3T 300 terminals, AVT 110 automatic multiple probe tester, and development and installation of industrial robots are discussed. For individual titles, see N84-11337 through N84-11339.

N84-11337# Joint Publications Research Service, Arlington, Va.
PROGRAMMED M3T 300 TERMINALS DISCUSSED c60
In its East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 1-4 Transl. into ENGLISH from Vyber Informaci (Czechoslovakia), (For primary document see N84-11336 02-31)
Avail: NTIS HC A03 no. 2, 1983 p 203-207

The M3T 300 programmed terminal was developed in cooperation with Mathematical Machines Research Institute of Prague. Scientific and engineering computations of medium length; acquisition, processing and communication of data of average volume; control and automation of technological processes and measurements; training of programmers; and applications in various industries are among the applications. Author

N84-11338# Joint Publications Research Service, Arlington, Va.
AVT 110 AUTOMATIC MULTIPLE PROBE TESTER DESCRIBED c33
In its East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 5-8 Transl. into ENGLISH from Inf. (West Germany) p 1-6 (For primary document see N84-11336 02-31)
Avail: NTIS HC A03

The automatic multiple probe tester AVT 110 designed for static and dynamic tests on analog and digital switching circuits and for high frequency measurements is developed. Besides its universality, the AVT 110 is characterized by the following features: (1) optional deployment of probe cards and manipulable probes; (2) self production and repair of probe cards by soldering and adjusting equipment; (3) z displacement of the probe needle on the probe cards; and (4) circuit box for pin electronics. The technical and economic parameters of the automatic multiple probe tester AVT 110 satisfy the most stringent quality requirements. Author

N84-11339# Joint Publications Research Service, Arlington, Va.
REPORT ON DEVELOPMENT, INSTALLATION OF INDUSTRIAL ROBOTS c54
Klaus Krakat *In its* East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 9-24 refs Transl. into ENGLISH from FS Analysen (West Germany), no. 1, (For primary document see N84-11336 02-31)
Avail: NTIS HC A03 1981 p 1-23

Different attitudes towards the utilization of industrial robots efficiency in the GDR economy, rationalization solutions to overcome bottle necks and defects, industrial robots for taking over certain working processes, characteristics figures and criteria for the useful economic effect of industrial robots, long term planning objectives, the current use of industrial robots and products of robot technology and their manufacturers. N.W.

N84-11340 Deutsche Gesellschaft fuer Forschung und Technologie e.V., Bochum (West Germany).
THE FUTURE OF MATERIALS [DIE ZUKUNFT DER WERKSTOFFE]
E. Hornbogen (Ruhr Univ., Bochum, West Germany) 1982 62 p

refs In GERMAN
(Rept-2/1982) Copyright. Avail: Issuing Activity

Materials science research strategies are discussed. Raw materials; materials and energy; future materials development; materials and manufacture; steel research till the year 2000; materials science evolution, and the future of materials are treated. Author (ESA)

N84-11341# Applied Research Association, Inc., Albuquerque, N. Mex.
FUNDAMENTAL PROPERTIES OF SOILS FOR COMPLEX DYNAMIC LOADINGS: DYNAMIC CONSTITUTIVE MODELING OF SANDY SOILS Annual Technical Report, 1 Aug. 1981 - 31 Jul. 1982
William C. Dass, Douglas H. Merkle, and Jimmie L. Bratton Apr. 1983 118 p refs
(Contract F49620-80-C-0088; AF Proj. 2307)
(AD-A131284; AFOSR-83-0653TR; ATR-2) Avail: NTIS HC A06/MF A01 CSCL 08/13

Constitutive modeling of cohesionless soil for both standard static test conditions and insitu impulsive dynamic load conditions is discussed in this annual report. Predicted laboratory response for several different types of models is evaluated using data from a coordinated testing program. The modeling of insitu soil response to explosive events (CIST and DISC Test) is considered, and the laboratory-derived models are tested for their convenience and accuracy in predicting ground motions. Several important laboratory and insitu phenomena which were not reflected by the model exercises are discussed. Based on the conclusions from this study, testing and modeling requirements for dynamic loading situations are proposed. GRA

N84-11342# Argonne National Lab., Ill.
ELASTIC-PLASTIC CONSTITUTIVE MODELING OF CONCRETE
Yukio Takahashi Mar. 1983 48 p refs
(Contract W-31-109-eng-38)
(DE83-014547; ANL-83-23) Avail: NTIS HC A03/MF A01

The need to understand concrete behavior under high temperatures in the nuclear industry has become rather acute. For this purpose, a constitutive model of concrete especially developed for this severe environment is indispensable. The constitutive models of concrete at standard temperature conditions are reviewed and their advantages and drawbacks considered. A rather simple but effective approach is selected to treat concrete behavior at high temperatures. Special emphasis is devoted to the modeling of concrete up to and including failure. The derived constitutive model is checked with biaxial and triaxial benchmark experimental results. Very good agreement is obtained. DOE

N84-11343# California Univ., Livermore. Lawrence Livermore Lab.
FEASIBILITY TESTS OF PIPELINE PIGS FOR CRYOGENIC PIPELINES
David L. Hipple 1983 10 p ref Presented at the Cryogenic Eng. Conf. and Intern. Cryogenic Mater. Conf., Colorado Springs, 15 Aug. 1983
(Contract W-7405-eng-48)
(DE83-015494; UCRL-88823; CONF-830841-2) Avail: NTIS HC A02/MF A01

The cryogenic pig experiment was designed to test the concept of using a pneumatically driven pipeline pig to force cryogenic fluid through a long, large diameter pipe, which is one of the key features of the proposed large-scale Spill Safety Test Facility. The Spill Safety Test Facility will spill materials such as liquefied natural gas (LNG), liquefied petroleum gas (LPG), ammonia, and other liquefied gases under controlled conditions so that atmospheric dispersion of these materials can be better understood. Three pig design concepts were tested: (1) commercially available, bullet-shaped polyurethane foam pigs, (2) close-fitting spherical metal pigs with sufficient clearance to pass through the pipe at cryogenic temperatures. Three different sizes were tested to determine the effect of a loose fit, and (3) cylindrical metal pigs with flexible wipers at each end which would maintain a seal during transit through the pipe. The most effective pigs in removing liquid from the pipe were the polyurethane foam pig and the cylindrical wiper pig. DOE

N84-11344# California Univ., Livermore. Lawrence Livermore Lab.
ON SETTING UP BOUNDARY CONDITIONS FOR SOIL-STRUCTURE INTERACTION PROBLEMS WITH DYNALK (A LING FROM TENSOR TO DYNA3D)
Lewis Thigpen and John C. Peterson Aug. 1983 25 p refs
(Contract W-7405-eng-48)
(DE83-016914; UCID-19867) Avail: NTIS HC A02/MF A01

Instructions on the use of the DYNALK computer program to generate boundary conditions for a soil island used in soil-structure interaction problems are given. DYNALK converts temporal motions from 2-D TENSOR calculations into appropriate three-dimensional boundary conditions for a DYNA3D soil-structure interaction problem. The program is operational on the CRAY-1 computer. DOE

N84-11345# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abteilung Mechanik.
A CONTRIBUTION TO THE CALCULATION OF MEASUREMENT UNCERTAINTY AND OPTIMIZATION OF MEASURING STRATEGIES IN COORDINATE MEASUREMENT Ph.D. Thesis - Tech. Hochschule Aachen [EIN BEITRAG ZUR BERECHNUNG DER MESSUNSICHERHEIT UND OPTIMIERUNG VON MESSSTRATEGIEN IN DER KOORDINATEN-MESSTECHNIK]
Franz Waeldele Jan. 1983 118 p refs In GERMAN
(PTB-Me-39; ISSN-0341-6720) Avail: NTIS HC A06/MF A01

The influence of sample shape deviations on the measurement uncertainties and the optimization of computer aided coordinate measurement were investigated for a circle and a cylinder. Using the complete error propagation law in matrix form the parameter uncertainties are calculated, taking the correlation between the measurement points into account. Theoretical investigations show that the measuring points have to be equidistantly distributed and that for a cylindrical body a measuring point distribution along a cross section is better than along a helical line. The theoretically obtained expressions to calculate the uncertainties prove to be a good estimation basis. The simple error theory is not satisfactory for estimation. The complete statistical data analysis theory helps to avoid aggravating measurement errors and to adjust the number of measuring points to the required measuring uncertainty. Author (ESA)

N84-11346# Schirmer-Plate Siempelkamp Hydraulische Pressen G.m.b.H., Krefeld (West Germany).
TECHNICAL INFORMATION CONCERNING RUBBER CUSHION PRESSES [TECHNISCHE INFORMATIONEN GUMMIKISSENPRESSEN]
E. Huydts 1982 18 p In GERMAN
Avail: NTIS HC A02/MF A01

High pressure rubber cushions which can be used for hot working were developed. The productivity of rubber cushion presses is increased by a continous cycle pallet rotary system. Author (ESA)

N84-11347# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany). Arbeitsgruppe fuer Mikrostrukturtechnik.
TECHNOLOGY OF THIN SILICON FOILS IN RESPECT TO THE FABRICATION OF MONOLITHIC INTEGRATED SENSORS Final Report, Jul. 1982
Laszlo Csepregi, Rolf Hauk, Rosemarie Niessl, and Helmut Seidel Bonn Bundesministerium fuer Forschung und Technologie May 1983 88 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-089; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,50

Methods for the fabrication of thin, low-doped silicon foils employing anisotropic selective etchants are studied. High and low doped epitaxial sandwich layers appear to be especially

appropriate. Such foils can be directly used for the fabrication of piezoresistive sensor structures. Anisotropic and selective etchants based on KOH and ethylendiamine were compared: KOH is cheaper, has better stability and lower selectivity. Cantilevers and bridges with high reproducibility and for a large variety of applications were fabricated. Methods igated for the fabrication of passivation and isolation layers with minimal mechanical stress on silicon were optimized. Oxynitride layers were seized on silicon without stress, while silicon nitride layers show a stress of 1 to 1.5 times 10 to the tenth power dyn/sqcm which may induce bends or even destruction. Author (ESA)

N84-11348# Hamburger Stahlwerke G.m.b.H. (West Germany).
MEASURES FOR THE IMPROVEMENT OF THE CONTINUOUS CASTING PROCEDURE (ELECTROMAGNETIC STIRRING) Final Report, Apr. 1980
Eckehard Foerster, Guenther Rudolph, and Karl Stercken Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 41 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-138; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,50

The influence of electromagnetic stirring on the formation of macrosegregation in the secondary cooling zone of the continuous casting procedure is considered. One rotating magnetic field stirrer and two different types of linear magnetic field stirrers were installed on one strand of a four strand billet caster. Billet samples (sulfur prints/chemical analyses) and samples of the cross section of the rolled wire (optical examination of the segregation zone in the etched cross section) were checked. An equiaxed crystallization is obtained. The share of the equiaxed crystallized billet rises with an increase of the applied stirring power: the earlier it becomes effective, the longer it lasts. Even with advanced equiaxed crystallization structure the formation of central segregations cannot be excluded. Material without segregation in connection with equiaxed crystallization structure was encountered only at extremely low casting temperatures. Author (ESA)

N84-11349# Freie Univ., Berlin (West Germany). Tieftemperaturlab.
OPTIMIZED He 2 COOLING SYSTEMS FOR SPACE APPLICATION. BEHAVIOR AND HANDLING OF SUPERFLUID HELIUM AT G = 0, PHASE 1 Final Report, Sep. 1981
Hans-Dietrich Denner, Gustav Klipping, Klaus Lueders, Klaus-Dieter Schotte, Ursula Schotte, Zsolt Szuecs, and Udo Ruppert Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 56 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-83-008; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

Increased reliability of He2 cooling systems for space applications is considered. An active phase separator (APS) with annular flow gap of variable length which allows variation of the cooling capacity over a wide range, developed for zero-g tests is described. Helium-tight electrical leadthroughs, a displacement transducer for low temperature application, a ball closure for use in combination with the APS, and gas/liquid detectors were developed. For temperature and liquid level measurement in narrow slits in laboratory as well as flight experiments, temperature sensors were developed. Three thickness measurement methods for He2 films are proposed: optical (1/10 000 to 1/100 mm), crystal (1/10 to the 7th power to 1/10 mm) and capacitive (1/10 to the 6th power to some mm). Author (ESA)

N84-11350 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Zentrallabor.
ELECTROFORMING OF COMPLICATED STRUCTURES FOR THE NUCLEAR AND AEROSPACE INDUSTRY
R. Suchentrunk 1983 20 p refs Presented at AES Intern. Electroforming/Deposition Forming Symp., Los Angeles, 23-24 Mar. 1983
(MBB-BB-536-82-OE) Copyright. Avail: Issuing Activity

Fabrication of concentrators for 100 kW solar energy plants; production of water cooled screens, boxes and targets for nuclear fusion experiments with the Joint European Torus; large scale fabrication of erosion protection shapes for airplanes; and fabrication of compact wind tunnel models by electroforming are discussed. Composition of electroforming electrolytes (nickel, copper); bath parameters; and process technology are described. Author (ESA)

N84-11351 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
FAST MULTI PURPOSE COMBAT CRAFT CONCEPT (FMPCC) FOR A HIGH SPEED NAVAL CRAFT
Claus Petters 15 Nov. 1982 46 p In ENGLISN and GERMAN Presented at Lecture to the Maritime Working Party 82, Gluecksburg, West Germany, Nov. 1982
(MBB-UT-18-82-OE) Avail: Issuing Activity

A wing in ground effect concept for a high speed naval craft is proposed. Hypothetical assignments, e.g., disruption of Warsaw Pact sea transports, and preventing enemy invasions, are presented. Manpower and performance advantages over conventional craft are indicated. Author (ESA)

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N84-11352*# Illinois Inst. of Tech., Chicago. Dept. of Electrical Engineering.
SYMBOL SYNCHRONIZATION FOR THE TDRSS DECODER
Daniel J. Costello, Jr. 3 Sep. 1983 8 p ref
(Grant NAG5-234)
(NASA-CR-170603; NAS 1.26:170603) Avail: NTIS HC A02/MF A01 CSCL 17B

Each 8 bits out of the Viterbi decoder correspond to one symbol of the R/S code. Synchronization must be maintained here so that each 8-bit symbol delivered to the R/S decoder corresponds to an 8-bit symbol from the R/S encoder. Lack of synchronization, would cause an error in almost every R/S symbol since even a 1-bit sync slip shifts every bit in each 8-bit symbol by one position, therby confusing the mapping betweeen 8-bit sequences and symbols. The error correcting capability of the R/S code would be exceeded. Possible ways to correcting this condition include: (1) designing the R/S decoder to recognize the overload and shifting the output sequence of the inner decoder to establish a different sync state; (2) using the characteristics of the inner decoder to establish symbol synchronization for the outer code, with or without a deinterleaver and an interleaver; and (3) modifying the encoder to alternate periodically between two sets of generators. A.R.H.

N84-11353*# Hawaii Univ., Manoa. Dept. of Electrical Engineering.
AUTOMATIC-REPEAT-REQUEST ERROR CONTROL SCHEMES
Shu Lin, Daniel J. Costello, Jr. (Illinois Inst. of Technology), and Michael J. Miller (South Australian Inst. of Technology) [1983] 57 p refs
(Grants NAG5-234; NSF ESC-81-02894)
(NASA-CR-170605; NAS 1.26:170605) Avail: NTIS HC A04/MF A01 CSCL 17B

Error detection incorporated with automatic-repeat-request (ARQ) is widely used for error control in data communication systems. This method of error control is simple and provides high system reliability. If a properly chosen code is used for error detection, virtually error-free data transmission can be attained.

Various types of ARQ and hybrid ARQ schemes, and error detection using linear block codes are surveyed. Author

N84-11354# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AN ON-BOARD CONTROL AND SUPERVISION SYSTEM FOR MULTIPLE SPACE MISSION APPLICATIONS IS CONSIDERED [UM SISTEMA DE CONTROLE E SUPERVISAO DE BORDO PARA APLICACOES EM (MULTI)MISSOES ESPACIAIS]
Jose Carlos Maldonado and Eduardo Whitaker Bergamini Jul. 1983 21 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Simposio Brasileiro de Telecomunicacoes, Rio de Janeiro
(INPE-2824-PRE/378) Avail: NTIS HC A02/MF A01

Real time supervisory tasks for data acquisition, processing, communication and control have extensive applications in the context of stratospheric balloon missions. An on-board supervision system for applications in (Multi) missions is presented. Multiple Ground Tracking and Control Stations and on Board Systems are expected to be involved in the (Multi) Missions configuration. Author

N84-11355# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A CARRIER RECOVERY CLOSED LOOP IMPLEMENTATION IN HIGH VELOCITY PSK MODEMS BY DIGITAL TECHNIQUES [UMA MALHA DE RECUPERACAO DE PORTADORA PARA IMPLEMENTACAO EM MODEMS PSK DE ALTA VELOCIDADE COM O RECURSO DE TECNOLOGIA DIGITAL]
Leon Lonneux Jul. 1983 13 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Simposio Brasileiro de Telecomunicacoes, Rio de Janeiro, 5-9 Sep. 1983
(INPE-2822-PRE/376) Avail: NTIS HC A01/MF A01

The use of conventional carrier recovery closed loops, in modems implemented through digital technics, is made difficult by the volume of signal processing that they require. An alternative solution in which the baseband componenus used for detecting the phase error are under-sampled was already presented. But, practical tests with this experimental carrier recovery closed loop revealed significant difficulties in order to obtain a satisfactory overall system performance. The insertion of a properly selected element in the closed loop can contribute significantly to the system stability. In this case, auxiliary elements are necessary to provide an efficient system performance, when in steady state, while obtaining a relatively fast transient response. Results obtained with the physical implementation of the model supported by digital techniques are presented. Author

N84-11356# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALYSIS OF A COMMUNICATION INTERFACE USING MULTIMICROPROCESSING [ANALISE DE UMA INTERFACE DE COMUNICACAO UTILIZANDO MULTIMICROPROCSSAMENTO]
Mauro Hissao Hashioka Jul. 1983 19 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Simposio Brasileiro de Telecomunicacoes, Rio de Janeiro, 5-9 Sep. 1983
(INPE-2823-PRE/377) Avail: NTIS HC A02/MF A01

An analytical model, based on queue theory, to estimate the average delay of a communication interface is presented. This interface is based on the parallel utilization of multiple microprocessors for data communication network. The analytical model provides results to evaluate the performance of the interface. Author

N84-11357# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AN ON BOARD CONTROL AND SUPERVISORY SYSTEM M.S. Thesis [UM SISTEMA DE CONTROLE E SUPERVISAO DE BORDO]
Jose Carlos Maldonado Jul. 1983 113 p refs In PORTUGUESE; ENGLISH summary
(INPE-2812-TDL/139) Avail: NTIS HC A06/MF A01

Real time supervisory tasks for data acquisition, processing, communication and control have extensive applications in the context of stratospheric balloon missions. An on Board supervision System is presented. It is based on an interactive system formed by two computers. One of the two computers is opertionally located on ground and works as a Control Station. The other computer, which supervises the mission experiments, is an on-board equipment. Real time control is made through the transmission and reception of telecommands. The software of this system is denominated Integrated Operational Program (POI/BALAO), and it is presented in Petri Net notation. A proposed upgrading of the supervision system is proposed for a multimission, real time, configuration. Multiple Ground Tracking and Control Stations and on-board system are expected to be involved in the multimission configuration. Author

N84-11358*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GEOMETRIC MODELS, ANTENNA GAINS, AND PROTECTION RATIOS AS DEVELOPED FOR BC SAT-R2 CONFERENCE SOFTWARE
Edward F. Miller [1982] 16 p refs Presented at the BC SAT-R2 Seminar, Lima, 18-22 Apr. 1983; sponsored by the Intern. Frequency Registration Board
(NASA-TM-83381; E-1655; NAS 1.15:83381) Avail: NTIS HC A02/MF A01 CSCL 20N

Mathematical models used in the software package developed for use at the 1983 Regional Administrative Radio Conference on broadcasting satellites. The models described are those used in the Spectrum Orbit Utilization Program (SOUP) analysis. The geometric relationships necessary to model broadcasting satellite systems are discussed. Antenna models represent copolarized and cross polarized performance as functions of the off axis angle. The protection ratio is modelled as a co-channel value and a template representing systems with frequency offsets. Author

N84-11359*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EFFECTS OF VEGETATION CANOPY ON THE RADAR BACKSCATTERING COEFFICIENT
Tsan Mo (Computer Sciences Corp., Silver Spring, Md.), Bruce J. Blanchard, and Thomas J. Schmugge Jul. 1983 71 p refs
(NASA-TM-85070; NAS 1.15:85070) Avail: NTIS HC A04/MF A01 CSCL 17I

Airborne L- and C-band scatterometer data, taken over both vegetation-covered and bare fields, were systematically analyzed and theoretically reproduced, using a recently developed model for calculating radar backscattering coefficients of rough soil surfaces. The results show that the model can reproduce the observed angular variations of radar backscattering coefficient quite well via a least-squares fit method. Best fits to the data provide estimates of the statistical properties of the surface roughness, which is characterized by two parameters: the standard deviation of surface height, and the surface correlation length. In addition, the processes of vegetation attenuation and volume scattering require two canopy parameters, the canopy optical thickness and a volume scattering factor. Canopy parameter values for individual vegetation types, including alfalfa, milo and corn, were also determined from the best-fit results. The uncertainties in the scatterometer data were also explored. Author

N84-11360*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE SUBJECTIVE EFFECT OF MULTIPLE CO-CHANNEL FREQUENCY MODULATED TELEVISION INTERFERENCE
Wayne A. Whyte, Jr., Michael A. Cauley (Cleveland State Univ.), and Peter P. Groumpos (Cleveland State Univ.) Nov. 1983 14 p refs Presented at the GLOBECOM IEEE Telecommun. Conf., San Diego, Calif., 29 Nov. - 1 Dec. 1983
(NASA-TM-83415; NAS 1.15:83415; E-1703) Avail: NTIS HC A02/MF A01 CSCL 17B

As the geostationary orbit/spectrum becomes saturated, there is a need for the ability to reuse frequency assignments. Protection ratios (the ratio of wanted signal power to interfering signal power at the receiver) play a key role in determining efficient frequency

reuse plans. A knowledge of the manner in which multiple sources of co-channel interference combine is vital in determining protection ratio requirements such that suitable margin may be allocated for multiple interfering signals. Results of tests examining the subjective assessment of multiple co-channel frequency modulated television signals interfering with another frequency modulated TV system are presented. Author

N84-11361*# Computer Technology Associates, Inc., Englewood, Colo.
INTEGRATED COMMAND, CONTROL, COMMUNICATION AND COMPUTATION SYSTEM DESIGN STUDY. SUMMARY OF TASKS PERFORMED
3 Dec. 1982 45 p
(Contract NAS5-26689)
(NASA-CR-170611; NAS 1.26:170611) Avail: NTIS HC A03/MF A01 CSCL 17B

A summary of tasks performed on an integrated command, control, communication, and computation system design study is given. The Tracking and Data Relay Satellite System command and control system study, an automated real-time operations study, and image processing work are discussed. R.J.F.

N84-11362# Ohio State Univ., Columbus. Electroscience Lab.
RADIATION PATTERNS OF AN ANTENNA MOUNTED ON THE OFF-MID SECTION OF AN ELLIPSOID Quarterly Report
Jeung G.. Kim and Walter D. Burnside Jun. 1983 69 p refs
(Contract N00019-81-C-0424)
(AD-A130956; ESL-714215-3) Avail: NTIS HC A04/MF A01 CSCL 20/14

An efficient numerical solution for the high frequency radiation patterns of an Antenna mounted on the Off-Mid Section (theta (sub s) not equal to 90 degrees) of an Ellipsoid is studied in this report. The Uniform Geometrical Theory of Diffraction (UTD) is the basic approach applied here and the elliptic cone perturbation method is used to simulate geodesic paths on the ellipsoid surface. The radiation patterns obtained using this technique are compared to those for prolate spheroid-mounted antennas, which have shown good agreement with measured data. Exact agreement between both results for typical spheroid geometries confirms that radiation patterns for ellipsoid mounted antennas can be solved efficiently by this numerical technique. GRA

N84-11363# Naval Research Lab., Washington, D. C.
A FORTRAN COMPUTER PROGRAM TO COMPUTE THE RADIATION PATTERN OF AN ARRAY-FED PARABOLOID REFLECTOR Interim Report
James K. Hsiao 21 Jul. 1983 16 p refs
(AD-A131060; NRL-8740) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report describes a FORTRAN computer program to compute the radiation pattern of a paraboloid reflector fed by an array. The program is formulated without simplification and approximation assumptions. Its results should represent an exact solution. The program is designed so that it is efficient for multiple sources. Judging from the examples computed, the increase in computer time is modest when the number of source of elements increases. GRA

N84-11364# RCA Government Communications Systems, Camden, N. J.
ON-LINE TRAFFIC MONITOR Final Technical Report, Jul. 1981 - Oct. 1982
Bernard E. Patrusky, Joe Rolla, Nina Jablokow, and Minh Nyugen Griffiss AFB, N.Y. RADC Mar. 1983 100 p
(Contract F30602-81-C-0219; AF Proj. 2022)
(AD-A131356; RADC-TR-82-327) Avail: NTIS HC A05/MF A01 CSCL 17/2

This report describes the design and the development of a system which gathers in real-time, statistics for all types of digital handled by the Integrated Node (IN). This system is called the On-Line Traffic Monitor. The monitor is a real-time, highly interactive hardware/software system consisting of a Perkin-Elmer 3220 coupled to the IN via shared memory. As the IN handles its traffic (packet, message and voice) it passes information to the monitor through the shared memory. The Monitor accepts this raw data, formats it, prints it out and stores the information on disk. The printouts essentially contain a snapshot of the current traffic and switching status in real-time. The data stored on disk is later used to generate those same printouts or more advanced statistics in graphical form. The statistics generated include voice call hold-times, calls blocked, number of active calls, packet delay, packet sizes, packet thruput, message delay, number of active messages, message thruputs, node overloads, and error statistics on the trunks. GRA

N84-11365# Polytechnic Inst. of New York, Brooklyn.
RESEARCH IN NETWORK MANAGEMENT TECHNIQUES FOR TACTICAL DATA COMMUNICATIONS NETWORKS Final Technical Report, 1 Sep. 1980 - 31 Aug. 1982
Robert Boorstyn, Aaron Kershenbaum, Basil Maglaris, and Philip Sarachik 1 Sep. 1982 438 p refs
(Contract DAAK80-80-K-0579)
(AD-A131357; CECOM-80-0579-F) Avail: NTIS HC A19/MF A01 CSCL 05/1

This is the final technical report for work performed on network management techniques for tactical data networks. It includes all technical papers that have been published during the control period. Research areas include Packet Network modelling, adaptive network routing, network design algorithms, network design techniques, and local area networks. Author (GRA)

N84-11366# Texas Univ., Austin. Geotechnical Engineering Center.
EFFECTS OF RIGID INCLUSIONS ON WAVE PROPAGATION Interim Report
Chairat Suddhiprakarn, Jose N. Roesset, and Kenneth H. Stokoe, II Mar. 1983 111 p refs
(Grant AF-AFOSR-0031-80; AF Proj. 2307)
(AD-A131366; GR83-3; AFOSR-83-0656TR) Avail: NTIS HC A06/MF A01 CSCL 08/13

The effect of rigid inclusions on the characteristics (amplitude and time of arrival) of shear and P-waves is investigated using a finite element model to discretize the region of interest and an explicit integration scheme. The effect of boundary conditions, type of excitation (point load versus distributed load) and wave length (or frequency of the excitation) are investigated and discussed. Author (GRA)

N84-11367# Control Energy Corp., Boston, Mass.
POTENTIAL APPLICATIONS OF CABLE TELEVISION (CATV) TO THE FEMA (FEDERAL EMERGENCY MANAGEMENT AGENCY) COMMUNICATIONS MISSION Final Report
Donald D. Gilligan, Homayoon Abtahi, James R. Becker, Jr., and Stephen W. Frantz Jul. 1983 165 p refs
(Contract EMW-C-0979)
(AD-A131326) Avail: NTIS HC A08/MF A01 CSCL 17/2

The history, technology, economics, regulation and vulnerability to electromagnetic pulse (EMP) effects of cable television are examined. Recommendations are made concerning FEMA integration of cable television systems into the FEMA emergency communications system and the protection of cable television systems for EMP effects. Author (GRA)

N84-11368# Harry Diamond Labs., Adelphi, Md.
THEORETICAL ANALYSIS OF NONRECIPROCAL ELECTROMAGNETIC SURFACE WAVE DEVICES
Clyde A. Morrison, Amanda F. Hansen, and Karla M. Sorenson Sep. 1983 34 p refs
(DA Proj. 1L1-61101-A-91A; HDL Proj. A103C4)
(AD-A131630; HDL-TR-2017) Avail: NTIS HC A03/MF A01 CSCL 20/14

An investigation of the possibility of building a low applied magnetic field isolator or nonreciprocal phase shifter at 90 GHz or at higher frequencies is given. The structure consists of a ferrite slab backed by a metal plate. A magnetic field is applied in the

plane of the ferrite slab. By solving Maxwell's equations, including the equation of motion of magnetization, we show that under appropriate conditions surface waves on the structure can exist. We further show that for different ferrite slab thicknesses and different applied magnetic fields, only waves traveling along the slab traverse to the applied magnetic field can exist. GRA

N84-11369# IRT Corp., San Diego, Calif.
CW (CONTINUOUS WAVE) ANTENNA DESIGN AND TESTING Final Report, 15 Jan. 1979 - 1 Aug. 1982
T. Buckman and R. W. Stewart 1 Aug. 1982 98 p
(Contract DNA001-79-C-0210; DNA Proj. G52-AAXE)
(AD-A131291; DNA-6188F) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report presents details of the development of HEMP relatable portable antenna for use with the existing DNA CW system. The rationale leading to the choice of a dielectric pre-stressed support tower and wire cage structure for the antenna arms is presented. Calculations of the antenna electromagnetic and mechanical performance parameters are given and confirmed by the presentation of preliminary measured operating data. Author (GRA)

N84-11370# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
A WIDEBAND LOW-SIDELOBE DISC-O-CONE ANTENNA
Jimmy L. Wong and H. E. King 15 Jul. 1983 14 p refs
(Contract F04701-82-C-0083)
(AD-A131440; SD-TR-83-49; TR-0083(3476-04)-1) Avail: NTIS HC A02/MF A01 CSCL 17/2

The electrical characteristics of a combined horn/cigar antenna are described. The antenna consists of a disc-on-rod (cigar) housed in a conical horn. This antenna combination produces broadband radiation characteristics with very low sidelobes. Measured VSWR, gain and pattern characteristics are presented. Author (GRA)

N84-11371# Polytechnic Inst. of New York, Brooklyn. Microwave Research Inst.
RAYS AND MODES ON CONCAVE SURFACES Final Report, 1 Jan. 1979 - 30 Jun. 1983
L. B. Felsen Jul. 1983 34 p refs
(Contract DAAG29-79-C-0005)
(AD-A131411; POLY-MRI-1429-83; ARO-15972.3-EL) Avail: NTIS HC A03/MF A01 CSCL 17/2

This Final Report summarizes the accomplishments under a research program concerned with the properties of electromagnetic fields, especially at high frequencies, in the presence of concave boundaries or interfaces. Author (GRA)

N84-11372# Semcor, Inc., Farmingdale, N.J.
MIL-STD-1553 MULTIPLEX APPLICATIONS HANDBOOK. ADDENDUM: CHAPTER 11 Final Report
Mar. 1983 123 p
(Contract DAAK80-79-C-0258)
(AD-A131551) Avail: NTIS HC A06/MF A01 CSCL 17/2

This document contains data words and message formats to be used for MIL-STD-1553 data bust applications. This document is intended as a guide for military & private sector designers to identify standard data words and messages for use in future avionics systems and subsystems. This report is to be Chapter 11 in the existing MIL-STD-1553 Multiplex Applications handbook which the Defense Materials Standards and Specifications Office (DMSSO) plans for publications as a Military Handbook on MIL-STD-1553. Author (GRA)

N84-11373# Stanford Linear Accelerator Center, Calif.
MICROWAVE MEASUREMENTS OF AZIMUTHAL ASYMMETRIES IN ACCELERATING FIELDS OF DISK-LOADED WAVEGUIDES
G. A. Loew, H. Deruyter, and W. Defa Mar. 1983 4 p refs Presented at Particle Accelerator Conf., Santa Fe, N. Mex., 21 Mar. 1983
(Contract DE-AC03-76SF-00515)
(DE83-012705; SU-SLAC-Pub-3076; CONF-830311-160) Avail: NTIS HC A02/MF A01

Microwave measurements of azimuthal asymmetries in the accelerating fields of the SLAC disk-loaded waveguide are presented. These field asymmetries lead to RF phase-dependent beam steering which can be detrimental to operation of linear accelerators in general and of the SLAC Linear Collider in particular. DOE

N84-11374# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
THE 2-1/2-DIMENSIONAL NUMERICAL SOLUTION FOR THE ELECTROMAGNETIC SCATTERING USING A HYBRID TECHNIQUE
K. H. Lee and H. F. Morrison Mar. 1983 14 p refs Presented at the Intern. Soc. of Exploration Geophys. Meeting, Las Vegas, Nev., 11-15 Sep. 1983
(Contract DE-AC03-76SF-00098)
(DE83-014860; LBL-15832; CONF-8309104-1) Avail: NTIS HC A02/MF A01

The use of the electromagnetic method for geothermal reservior exploration and delineation was studied. A number of techniques were developed to provide high quality field data. The remaining problem of interpreting these data in regions of complex geologic structure was overcome by the development of a numerical solution based on the hybrid technique, making use of both the finite element and the integral equation techniques. The major improvement is in the computing speed. DOE

N84-11375# Valvo G.m.b.H., Hamburg (West Germany).
DEVELOPMENT OF NEW INTEGRATED CONCEPTS FOR DIGITAL COLOR VIDEO PROCESSING Final Report, Dec. 1981
Wolfgang Weltersbach and Leo Warmuth Bonn Bundesministerium fuer Forschung und Technologie May 1983 122 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-079; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25,65

Methods for digitizing video signal processing in color television receivers are reported. Concepts for digital decoding of the composite video signal were developed, including integratable components such as memories and delay lines. Digital systems for color video signal processing in real-time were designed. A digital PAL decoder, which includes the complete video signal processing and can be integrated on a monolithic chip was built and tested. Performance is good compared with analog PAL decoders, especially for noisy signals. High color fidelity and reduced cross color effect are emphasized. Author (ESA)

N84-11376# Technical Univ. of Denmark, Lyngby. Electromagnetics Inst.
ON THE ASSESSMENT OF ERRORS DUE TO ANTENNA PATTERN IMPERFECTIONS: EXECUTIVE SUMMARY Final Report
Finn Soendergaard Pedersen and Ivan Munkstrup Jan. 1982 15 p refs
(Contract ESA-4479/80/F/DD/SC)
(TUD-R-253; ESA-CR(P)-1575-Annex) Avail: NTIS HC A02/MF A01

The relative influence of radiometer parameters such as antenna sidelobe level, antenna cross polarization level and radiometer sensitivity on the measurement of the brightness temperature of the environment and on the estimation of physical parameters was studied in order to optimize specifications of the subsystems in a complete radiometer system. A nonrotational symmetrical pattern for the cross polarized patterns with two main lobes and sine squared theta variations in the theta plane is proposed. Brightness temperature is restored from the output of the two antenna ports by compensating the signal in the far-off sidelobes and in the spillover lobes, and by decoupling of the mixing of polarizations. The influence of cross polarization level

on physical parameter estimation is almost eliminated, and sidelobe level influence is reduced. Author (ESA)

N84-11377# Heinrich-Hertz-Institut, Berlin (West Germany).
BROADBAND COMMUNICATION WITH FIBER OPTIC CHANNELS Final Report, Feb. 1982
Rolf Evers Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 147 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-118; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31

The application of fiber optic transmission to integrated services broadband systems and the combined effect between digital networks with distributed switches and conventional analog networks are discussed. A laboratory test system unit, comprising an integrated digital system for narrow and broadband communication and an analog system for narrow and broadband communication, was set up. The compatible interconnection between the digital and the analog broadband as well as between the narrow and broadband networks was demonstrated. It is concluded that broadband communication systems can be established with optical fibers. The system is available for a planned scientific evaluation. Author (ESA)

N84-11378# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
MATHEMATICAL MODELS FOR THE BRIGHTNESS TEMPERATURE OF OBJECT AND ENVIRONMENT IN THE MICROWAVE REGION
Juergen Preissner and Volker Stein May 1982 53 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-829)
(DFVLR-FB-83-12) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 17,10

A computer program for the calculation of the brightness temperature of object and environment was developed. Object and ground were modeled by flat surfaces with the panel method. The radiation of sky, ground and atmosphere as well as the pattern of the sensor antenna are described by mathematical models. The computations were carried out for a simply structured object on a lossy ground. The brightness temperature is presented as a function of the sensor position for the frequencies 11, 32, 90, and 140 GHz. With knowledge of the temperature definition of the sensors, this mode enables the discernability of objects in their environment to be deduced. Author (ESA)

N84-11379# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Hochfrequenzphysik.
OFFSET-REFLECTOR WITH HORN FEED ARRAY AS AN EXPERIMENTAL SENSOR FOR RADIOMETRIC MEASUREMENTS
Hans-Juergen Steiner Jan. 1983 53 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-830)
(DFVLR-FB-83-16; ESA-TT-830) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 19,50

A sensor consisting of a single offset reflector antenna with five beams for radiometric measurements with multiple receivers is presented. The design procedure and the arrangement of the feeds is described. A procedure for the exact adjustment of the reflector in relation to the feeds is outlined. The horn antenna was positioned for linear polarization so as to place the maxima of the beams in a straight line. The sidelobe distances of all beams are practically equal, the half-width values differ only slightly. Calculated and measured radiation diagrams show good accordance. Author (ESA)

N84-11380# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
COMPUTER MODEL FOR A CIRCULAR SYMMETRIC CAVITY WITH APPLICATION FOR LENS ANTENNAS
Hans Steyskal Jul. 1983 57 p refs
(FOA-C-30332-E; ISSN-0347-3708) Avail: NTIS HC A04/MF A01; Research Inst. of National Defence, Stockholm KR 50

A computer model for the analysis and design of circular symmetric cavities built in stripline to distribute input power to lens antenna elements was developed. A one-mode (TEM) approximation is used for the fields on the stripline. Coupling between neighboring lines is accounted for by using a periodic structure approach. A taper in stripline width for impedance matching is included. Numerical results are compared with measurements and independent computations. Numerical accuracy is on the order of + or - 2 dB, but measurements were made on a microstrip cavity, and measuring accuracy is unknown. There is an unexplained difference in the computed coupling coefficient when using the cavity input impedance or the input admittance for the cavity-stripline junction problem. Author (ESA)

N84-11381# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
ESTIMATES OF MILLIMETER WAVE ATTENUATION FOR 18 UNITED STATES CITIES
Kenneth C. Allen, Hans J. Liebe, and Charles M. Rush May 1983 72 p refs
(PB83-240630; NTIS/REPORT-83-119) Avail: NTIS HC A04/MF A01 CSCL 17B

Brief discussions of three mechanisms that attenuate millimeter waves in the atmosphere are presented: rain attenuation, clear air absorption, and atmospheric multipath. Propagation models were combined with meteorological statistics to obtain estimates of average year attenuation distributions for 18 cities in the United States. The estimates are presented in such a way to elucidate the restrictions on system parameters required for reliable operation, i.e. frequency, path length for terrestrial paths, and path elevation angle for earth-satellite paths. The variation imposed by the diverse climates within the United States is demonstrated. Generally, in regions that have humid climates, millimeter wave systems perform less faborably than in areas where arid or semi-arid conditions prevail. Author (GRA)

N84-11382*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
A SIMPLE MODEL FOR THE DEPOLARIZING EFFECTS OF RAIN AND ICE ON EARTH-SATELLITE LINKS IN THE 10 TO 30 GHz FREQUENCY RANGE Interim Report
Donald L. Runyon, Jr. and Warren L. Stutzman Jun. 1983 304 p refs
(Contract JPL-955954)
(NASA-CR-174482; NAS 1.26:174482; PB83-237297; VPISU/EE/SATCM-83/3) Avail: NTIS HC A14/MF A01 CSCL 17B

The effects of rain and ice on the polarization reuse technique for Earth-space communications is studied. Rain-induced depolarization as a function of attenuation is examined in detail using a rigorous multiple scattering model. A simple expression for cross polarization discrimination in terms of attenuation, frequency, elevation angle, raindrop canting angle spread, and fraction of oblate raindrops is derived for the 10 to 30 GHz band. Prediction accuracy is quantified by comparisons to measured data and other model values. The impact of depolarization effects on the carrier-to-noise ratio for digital phase shift keyed systems is discussed. Preliminary results for ice layer effects are presented. Author (GRA)

N84-11383# National Telecommunications and Information Administration, Washington, D.C.
INTEROPERABILITY OF THE EUROPEAN DEFENSE COMMUNICATIONS SYSTEM WITH TRI-SERVICE TACTICAL COMMUNICATIONS
J. A. Hoffmeyer May 1983 179 p refs Sponsored in part by the Army Communications Systems Agency
(PB83-240614; NTIA/REPORT-83-123) Avail: NTIS

HC A09/MF A01 CSCL 17B

The different types of interoperability requirements are discussed, several related research and development projects are summarized, and alternatives for achieving interoperability between the Defense Communications System and the TRI-Service Tactical Communications System are presented. These alternatives are evaluated, and a preferred alternative is recommended. Brief tasking statements which are recommended to as the next steps in pursuing a research and development program for developing interoperability of the two systems at both the transmission subsystem level and at the end-to-end subscriber level are included. For transmission subsystem interoperability, emphasis is placed on the Digital European Backbone and Digital Radio and Multiplexer Acquisition portions of the European DCS. GRA

N84-11384# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.

APPROXIMATE FORMULAS FOR THE FAR FIELDS AND GAIN OF OPEN-ENDED RECTANGULAR WAVEGUIDE

Arthur D. Yaghjian May 1983 40 p refs

(PB83-233999; NBSIR-83-1689) Avail: NTIS HC A03/MF A01 CSCL 09E

Approximate formulas are derived for the far field and gain of standard, open-ended, unflanged, rectangular waveguide probes operating within their recommended usable bandwidth of frequencies. (Such probes are commonly used in making probe-corrected near-field antenna measurements.) The formulas, which yield forward far-field power patterns and on-axis gains of X-band and larger waveguide probes to within about 2 dB and 0.2 dB accuracy, respectively, assume (sin theta-cos theta) azimuthal angular dependence and an E-plane pattern given by the traditional aperture integration of the TE-10 mode Eand H-fields in the Stratton-Chu equations. GRA

N84-11713# Joint Publications Research Service, Arlington, Va.

OBJECTIVIZATION OF EVALUATION OF SPEECH INTELLIGIBILITY DURING FLIGHTS

M. V. Frolov, O. A. Cherkasov, G. I. Tarasenko, and I. A. Petlenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 117-120 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 80-81 (For primary document see N84-11693 02-51)

Avail: NTIS HC A08

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N84-11385*# TRW Electronic Systems Group, Redondo Beach, Calif.

A 20-GHz IMPATT TRANSMITTER Final Report, Aug. 1980 - Jul. 1982

J. L. Chan and C. Sun Jun. 1983 240 p refs

(Contract NAS3-22492)

(NASA-CR-168076; NAS 1.26:168076) Avail: NTIS HC A11/MF A01 CSCL 09A

The engineering development of a solid state transmitter amplifier operating in the 20 GHz frequency band. The development effort involved a variety of disciplines including IMPATT device development, circulator design, simple and multiple diode circuits designs, and amplifier integration and test. For individual titles, see N84-11386 through N84-11387.

N84-11386*# TRW Electronic Systems Group, Redondo Beach, Calif.

A 20-GHz IMPATT TRANSMITTER, SUMMARY

In its A 20-GHz IMPATT Tansmitter Jun. 1983 126 p (For primary document see N84-11385 02-33)

Avail: NTIS HC A11/MF A01 CSCL 09A

A three stage IMPATT diode amplifier capable of a 16 W CW output and a 2 dB bandwidth of 117 MHz was developed. On the component side, high performance circulators with a 0.2 dB insertion loss and bandwidth of 5 GHz were fabricated. State of the art GaAs IMPATT diodes incorporating diamond heat sink and double Read doping profile were also developed. The diodes are capable of a 2.5 W CW output. A few diodes achieved power outputs as high as 3 W. On the circuit side, high gain (up to 12 dB per stage) single diode, multituned circuits capable of 2 GHz and 930 MHx bandwidth were developed as the first and second stages, respectively, of the amplifier. A 12 diode waveguide cavity combiner was developed as the output stage. The output stage utilized commercially available single drift GaAs IMPATT diodes. J.M.S.

N84-11387*# Raytheon Co., Lexington, Mass. Research Div.

A 20-GHz IMPATT DIODE DEVELOPMENT

D. Masse, M. G. Adlerstein, B. D. Lauterwasser, J. W. McClymonds, and S. R. Steele *In* TRW Electronic Systems Group A 20-GHz IMPATT Transmitter Jun. 1983 103 p refs Prepared for TRW Electronic Systems Group, Redondo Beach, Calif. (For primary document see N84-11385 02-33)

(S-3057) Avail: NTIS HC A11/MF A01 CSCL 09A

The development of 20 GHz, double drift GaAs IMPATT diodes is described. Advances made in material growth, diodes fabrication technology and packaging, and circuit design and diode testing are documented. J.M.S.

N84-11388*# Westinghouse Electric Corp., Pittsburgh, Pa.

DEVELOPMENT AND FABRICATION OF AN AUGMENTED POWER TRANSISTOR Final Report, 22 Jul. 1981 - 21 Feb. 1983

M. J. Geisler, F. E. Hill, and J. A. Ostop 1 Aug. 1983 65 p refs (Contract NAS3-22782)

(NASA-CR-168262; NAS 1.26:168262; DYD-10892-CE; Rept-83-9FS-ATRAN-R1) Avail: NTIS HC A04/MF A01 CSCL 09A

The development of device design and processing techniques for the fabrication of an augmented power transistor capable of fast switching and high voltage power conversion is discussed. The major device goals sustaining voltages in the range of 800 to 1000 V at 80 A and 50 A, respectively, at a gain of 14. The transistor switching rise and fall times were both to have been less than 0.5 microseconds. The development of a passivating glass technique to shield the device high voltage junction from moisture and ionic contaminants is discussed as well as the development of an isolated package that separates the thermal and electrical interfaces. A new method was found to alloy the transistors to the molybdenum disc at a relatively low temperature. The measured electrical performance compares well with the predicted optimum design specified in the original proposed design. A 40 mm diameter transistor was fabricated with seven times the emitter area of the earlier 23 mm diameter device. R.J.F.

N84-11389*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

HYBRID POWER SEMICONDUCTOR SWITCH Patent Application

Dan Y. Chen, inventor (to NASA) Filed 30 Sep. 1983 11 p

(NASA-Case-LEW-13922-1; US-Patent-Appl-SN-537614) Avail: NTIS HC A02/MF A01 CSCL 09A

The voltage rating of a bipolar transistor may be greatly extended while at the same time reducing its switching time by operating it in conjunction with FETs in a hybrid circuit. One FET is used to drive the bipolar transistor and an inductive load. Both FETs are turned on or off by a single drive signal of load power, the second FET upon ceasing conduction, rendering one power electrode of the bipolar transistor open. Means provided to

dissipate currents which flow after the bipolar transistor is rendered nonconducting. NASA

N84-11390*# Honeywell Electro-Optics Center, Lexington, Mass.
DEVELOPMENT OF A HgCdTe PHOTOMIXER AND IMPEDANCE MATCHED GaAs FET AMPLIFIER Final Technical Report, 4 Nov. 1980 - 1 Sep. 1982
J. F. Shanley, W. A. Paulauskas, and D. R. Taylor Nov. 1982 63 p refs
(Contract NAS5-26365)
(NASA-CR-170608; NAS 1.26:170608) Avail: NTIS HC A04/MF A01 CSCL 09A

A research program for the development of a 10.6 micron HgCdTe photodiode/GaAs field effect transistor amplifier package for use at cryogenic temperatures (77k). The photodiode/amplifier module achieved a noise equivalent power per unit bandwidth of 5.7 times 10 to the 20th power W/Hz at 2.0 GHz. The heterodyne sensitivity of the HgCdTe photodiode was improved by designing and building a low noise GaAs field effect transistor amplifier operating at 77K. The Johnson noise of the amplifier was reduced at 77K, and thus resulted in an increased photodiode heterodyne sensitivity. R.J.F.

N84-11391# Texas Technological Univ., Lubbock.
REVERSE BIAS SECOND BREAKDOWN IN POWER SWITCHING TRANSISTORS Final Report
W. M. Portnoy Kirtland AFB, N. Mex. AFWL May 1983 62 p refs
(Contract F29601-81-K-0037; AF Proj. 3763)
(AD-A130145; AFWL-TR-82-139) Avail: NTIS HC A04/MF A01 CSCL 09/1

The second breakdown characteristics under reverse base drive have been investigated for two n-p-n power switching transistor structures using a non-destructive testing circuit. Three types of second breakdown have been identified, all occurring in a single device under different operating conditions. Primary mechanisms, neither of which involve a critical temperature, have been proposed for two of the types. The third type has not previously been reported, nor has a mechanism been proposed. The experimental evidence at this time excludes adiabatic heating as a principal cause of second breakdown in the test devices. Author (GRA)

N84-11392# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
JOINT SERVICES ELECTRONICS PROGRAM Annual Progress Report, 1 Apr. 1982 - 31 Mar. 1983
N. Bloembergen 1 Apr. 1983 39 p refs
(Contract N00014-75-C-0648)
(AD-A130985; APR-96) Avail: NTIS HC A05/MF A01 CSCL 09/5

An annual report of the JSEP (Joint Services Electronic Program) in solid state electronics, quantum electronics, information electronics control and optimization and electromagnetic phenomenon is presented. Results of the research to date are summarized and significant accomplishments are discussed. Author (GRA)

N84-11393# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TYPE KODEK DC MODEMS FOR USE IN CYFRONET TERMINAL NETWORK
Zbigniew Hoffman and F. W. Lewczanoski 28 Jun. 1983 11 p refs Transl. into ENGLISH from Przeglad Telekomun. (Poland), v. 50, no. 12, 1977 p 373-375
(AD-A131057; FTD-ID(RS)T-0779-83) Avail: NTIS HC A02/MF A01 CSCL 09/5

A KODEK is a device which connects an asynchronous or synchronous terminal to a computer via a telephone line with twisted pairs. This device can be used in terminal networks, when the distance of the terminal from the computer does not exceed several kilometers and the frequency band transmitted over the telephone line is not limited to the 300 to 3400 Hz range. The KODEK is equipped with a standard V-24 interface. GRA

N84-11394# Virginia Univ., Charlottesville. Dept. of Materials Science.
DESIGN AND TESTING OF HIGH PERFORMANCE BRUSHES Final Report, 1 Feb. 1982 - 31 May 1983
Doris Kuhlmann-Wilsdorf May 1983 14 p
(Contract N00014-82-K-0267)
(AD-A131348) Avail: NTIS HC A02/MF A01 CSCL 20/3

The aim of this contract has been to increase still further the capabilities of high-performance electrical brushes, as commercially available as well as, indeed with particular emphasis on, the metal fiber and QM brushes. The result of this research has been to confirm and expand somewhat both the theoretical and experimental advances made in the preceding six years. Additionally contributions were made to ancillary research areas, specifically research on friction and wear, and the dislocation behavior controlling wear. GRA

N84-11395# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
RELIABILITY ANALYSIS OF THE GRADUAL DEGRADATION OF SEMICONDUCTOR DEVICES
Michael F. Millea 20 Jul. 1983 48 p refs
(Contract F04701-82-C-0083)
(AD-A131375; TR-0083(3925-02)-1; SD-TR-83-52) Avail: NTIS HC A03/MF A01 CSCL 09/1

A review of the recent results on accelerated aging of both power and low-noise GaAs FETs indicates that the major failure mode occurs by gradual deterioration and not by the usually (implicity) assumed catastrophic device failure. It is shown that assuming catastrophic degradation when devices actually fail gradually can lead to incorrect device reliability predictions. The analysis of accelerated aging results for a gradual degradation failure mode is indicated. Author (GRA)

N84-11396# California Univ., Los Angeles. Dept. of Electrical Engineering.
FINITE-ELEMENT APPROACH TO GUIDED WAVE PROBLEMS Final Technical Report, 1980 - 1983
Cavour Yeh Mar. 1983 7 p
(Contract DAAG29-80-K-0051)
(AD-A131623; ARO-16903.3-EL; UCLA-ENG-EE065) Avail: NTIS HC A02/MF A01 CSCL 09/5

This report summarizes the results of the research carried out at the Electrical Engineering Department of the University of California at Los Angeles under contract DAAG29-80-K-0051 with the Army Research Office. The research dealt with the analyses of guided wave problems for millimeter/optical dielectric waveguide structures as well as acoustic wave guiding structures using the finite-element technique. Author (GRA)

N84-11397# Texas Univ., Austin. Electronics Research Center.
ELECTRONICS RESEARCH AT THE UNIVERSITY OF TEXAS AT AUSTIN Annual Report, 1 Apr. 1982 - 31 Mar. 1983
Edward J. Powers 15 May 1983 103 p refs
(Contract F49620-82-C-0033)
(AD-A131130; AR-30) Avail: NTIS HC A06/MF A01 CSCL 09/1

This report summarizes progress on projects carried out at the Electronics Research Center at The University of Texas at Austin and which were supported by the Joint Services Electronics Program. In the area of Information Electronics progress is reported for projects involving (1) nonlinear detention and estimation and (2) electronic multi-dimensional signal processing. In the Solid State Electronics area recent findings in (1) interface reactions, instabilities and transport and (2) spectroscopic studies of metal/semiconductor and metal/metal oxide interfaces are described. In the area of Quantum Electronics progress is presented for the following projects: (1) nonlinear wave phenomena, (2) structure and kinetics of excited state molecules and (3) collective effects in nonlinear optical interactions. In the electromagnetics area progress in guidedwave devices for the far-infrared-mm wave spectrum is summarized. Author (GRA)

N84-11398# Utah Univ., Salt Lake City. Dept. of Physics.
INTERNAL NOISE OF LOW-FREQUENCY PREAMPLIFIERS Interim Technical Physics.
Steven W. Smith 15 Aug. 1983 15 p
(Contract N00014-82-K-0603)
(AD-A131532; TR-2) Avail: NTIS HC A02/MF A01 CSCL 09/1

Experimental measurements of low frequency preamplifiers show that a type LM394 bipolar input stage has less internal input noise than the popular PAR-113 commercial amplifier for source resistances under 1000 ohms. A type 2N6483 JFET design shows similar input noise to the PAR-113. The input current noise of the JFET design is insignificant compared with the Nyquist noise of the source resistance. Author (GRA)

N84-11399# Los Alamos Scientific Lab., N. Mex.
EXPERIMENTAL INVESTIGATION OF EXPLOSIVE-DRIVEN PLASMA-COMPRESSION OPENING SWITCHES
J. H. Goforth and R. S. Caird 1983 5 p refs Presented at IEEE Power Electron. Specialists Conf., Albuquerque, N. Mex., 6 Jun. 1983
(Contract W-7405-eng-36)
(DE83-0124200; LA-UR-83-1573; CONF-830621-29) Avail: NTIS HC A02/MF A01

Plasma-compression opening-switch techniques are being developed for use in explosive-driven magnetic flux compression generator applications. A test bed for performing low cost experimentation is described. Experiments with approx. 0.15 MA/cm linear current density in the switch have achieved resistance increases of a factor of 10 in a few hundred nanoseconds. Peak field strengths of 30 KV/cm are generated in these tests. Data are presented from preliminary tests that indicate reduced pressure in the plasma cavity enhanced switch performance. DOE

N84-11400# Brookhaven National Lab., Upton, N. Y.
CORRELATION OF SUPERCONDUCTOR STRAND, CABLE, AND DIPOLE CRITICAL CURRENTS IN CBA MAGNETS
M. J. Tnnenbaum, M. Garber, and W. B. Sampson 1982 5 p refs Presented at the Appl. Superconductivity Conf., Knoxville, Tenn., 30 Nov. - 3 Dec. 1982 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE83-003951; BNL-32245; CONF-821108-31) Avail: NTIS HC A02/MF A01

A calibration between vendor critical current data for 0.0268 in diameter superconductor strand and the BNL 10 to the minus 12th power (LAMBDA)cm critical current specification is presented. Vendor critical current data for over 400 Fermilab type billets are shown, both as supplied by the vendor and converted to BNL units. Predictions of cable critical current are made using the sum of the critical currents of the 23 strands, where all strands from the same half billet are assigned the same critical current. The measured critical current shows excellent correlation to the predicted value and is approximately 14 +or- 2 percent below it. Colliding Bean Accelerator full length dipoles reach the conductor critical current limit, essentially without training. Magnet performance is predictable from the measured critical current of a short sample of cable to within 2%. DOE

N84-11401# Gould, Inc., Rolling Meadows, Ill.
MAINTENANCE-FREE, DEEP-DISCHARGE, LEAD-ACID BATTERY FOR PHOTOVOLTAIC APPLICATIONS: PHASE TWO
J. R. Willhite May 1983 91 p refs
(Contract DE-AC04-76DP-00789)
(DE83-013561; SAND-83-7090) Avail: NTIS HC A05/MF A01

Battery cycle life and decrease cycle-life cost were emphasized. In deep-cycle testing with extended periods of incomplete charge, it was shown that the sealed batteries could perform with no maintenance. The self-discharge rates at 30 C and -17.80 C were less than 1%/week for open circuit stand times of up to three months. A charging method which limits the recharge voltage to less than about 2.5 volts was found to increase cycle life. In a test simulating the effects of losing water from the electrolyte, the design of a 90% saturated separator was found to be nearly optimal for maintaining high capacity and reducing the water loss rate. A high porosity electrode was demonstrated in small cells which has the potential for additional cell capacity increases or cost reductions. DOE

N84-11402# Varian Associates, Palo Alto, Calif.
THE 60-GHz GYROTRON DEVELOPMENT PROGRAM Quarterly Report, Oct. - Dec. 1982
J. F. Shively, R. E. Bier, M. Caplan, E. K. Choi, L. J. Craig, S. J. Evans, K. L. Felch, L. J. Fox, G. Hu, H. E. Huey et al 1983 110 p refs
(Contract W-7405-eng-26)
(DE83-012922; ORNL/SUB-79-21453/14; QR-14) Avail: NTIS HC A06/MF A01

A microwave oscillator capable of producing 200 kW of CW power at 60GHz was developed. A modified cavity was demonstrated in a pulsed tube to have improved dynamic range. A secondary task of developing a 56 GHz CW tube produced in excess of 100 kW at this alternate frequency. A larger cone waterload suffered from lack of rf beam divergence. Waterload designs are being constructed and tested in conjunction with X-6, a with cavity and window designs. Additional alternative window designs are being explored and developed. DOE

N84-11403# Sandia Labs., Albuquerque, N. Mex.
SWITCHING-SPEED IMPROVEMENTS IN PLZT SHUTTERS
George R. Laguna 1983 6 p refs Presented at the IEEE Intern. Symp. on Appl. of Ferroelec., Gaithersburg, Md., 1 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013096; SAND-83-0101C; CONF-830637-2) Avail: NTIS HC A02/MF A01

Development of up to 152-mm diameter PLZT shutters for the USAF is an ongoing project at Sandia National Laboratories. One of the goals of this development is to attain the same switching speeds achieved in smaller diameter devices. A method is suggested from the use of frequency analysis. In addition, a constant current discharge is substituted for the usual exponential discharge. DOE

N84-11404# SRI International Corp., Menlo Park, Calif. Materials Research Lab.
TEMPERATURE LIMITATION OF PRIMARY AND SECONDARY ALKALINE BATTERY ELECTRODES Final Report
M. C. H. McKubre May 1983 177 p refs
(Contract DE-AC03-76SF-00098)
(DE83-015009; LBL-16141) Avail: NTIS HC A09/MF A01

The results of studies of the mechanisms of dissolution and passivation of Fe and Zn electrodes in concentrated KOH, as these processes effect the charge/discharge characteristics of alkaline batteries are discussed. The experimental techniques principally employed were: potentiodynamic sweep voltammetry and coulometry, rotating disk and rotating ring disk electrode studies under constant velocity and constant acceleration rotation conditions, and AC impedance studies. The results obtained on Fe electrodes enabled a detailed mechanism for the formation and discharge of an oxide film on iron via a number of dissolved intermediate species. The mechanisms are different at high and low temperatures, but at all temperatures pathways via dissolved phase intermediates result in substantial dissolution of metal and oxide. At 750 C dissolution processes account for more than 7.5% of the total charge stored per cycle. AC impedance measurements were used to characterize the nature of the oxide film, and to determine an effective exchange current density for the Fe/Fe(2) Redox process. DOE

N84-11405# Singer Co., Little Falls, N. J. Kearfott Div.
APPLICATION GUIDELINES FOR QUALITY ASSURANCE PROCEDURES FOR HYBRID MICROCIRCUITS Final Technical Report
G. H. Ebel, H. A. Engelke, D. J. Glick, J. A. Jeffrey, and B. D. Ossenkopp Mar. 1983 142 p refs
(Contract F30602-79-C-0181; AF Proj. 2338)

(AD-A131395; Y256P074) Avail: NTIS HC A07/MF A01 CSCL 09/5

The objective of this effort was to generate a complete package of documentation to define Quality Assurance Procedures for Hybrid Microcircuits. Implementation of these documents should result in reliable, cost effective hybrids for use in government equipment. The very nature of hybrids makes the generation of standard documents a difficult task since no two hybrid microcircuit suppliers use the same approach, materials, processes or procedures. The documents developed during this contract attempt to cover most cases that occur in the hybrid microcircuit industry today. GRA

N84-11406# Florida Univ., Gainesville. Engineering and Industrial Experiment Station.

SEPERATORS FOR LITHIUM ALLOY-IRON SULFIDE FUSED-SALT BATTERIES Final Report

R. D. Walker, Jr. 15 Jun. 1983 14 p refs

(DE83-016203; DOE/OR-90300/T1) Avail: NTIS HC A02/MF A01

The principal objective was to make a continuous sheet of chemically resistant materials having the desired physical properties. This objective was not achieved owing primarily to the basic characteristics of the principal material, boron nitride fibers. The work undertaken with the paper machine itself and with the various stages of the papermaking process is summarized. Several suggestions of alternative techniques and different approaches are included. DOE

N84-11407# General Electric Co., Schenectady, N. Y. Corporate Research and Development.

DEVELOPMENT OF A CESIUM-VAPOR-LAMP SYSTEM FOR TRIGGERING PHOTOTHYRISTORS Final Report

H. L. Witting EPRI Jun. 1983 40 p refs

(EPRI Proj. 1291-2)

(DE83-902691; EPRI-EL-3140) Avail: NTIS HC A03/MF A01

A pulsed cesium vapor light source was developed to trigger photothyristors for power conversion applications in electric utility substations. Work on pulsed cesium lamps has yielded promising lamp life and total light output, i.e., one lamp could trigger several hundred thyristors. However, the light intensity that could be delivered to the thyristor gates at the end of 18 m long fiber optic cables was marginal. Rather high pulse currents (2000 A) appeared necessary to reach the goal of 10 times the thyristor threshold intensity. Large increases in effective light output intensity were obtained by advances in the lamp design and by using more efficient fiber optic cables. The cesium amalgam lamps contain mercury in addition to cesium and have a reduce bore to increase the arc intensity. Single fiber, fused silica cables of remarkable efficiency were tested. As a result, 33 times the thyristor threshold intensity at pulse currents of only 300 A were delivered. At such moderate current levels, no fundamental limitations to lamp life in life tests that have reached 40,000 hours (8.5 billion pulses) were found. DOE

N84-11408# Argonne National Lab., Ill.

CHEMISTRY OF LITHIUM ALLOY/IRON SULFIDE CELLS

1983 15 p refs Presented at the 163rd Electrochem. Soc. Meeting, San Francisco, 8 May 1983

(Contract W-31-109-eng-38)

(DE83-014815; CONF-830508-25) Avail: NTIS HC A02/MF A01

After a brief review of the Li-Al and Li-Si alloys used as negative electrode materials in molten salt batteries, the phases formed in FeS and FeS2 positive electrodes during cell operation are discussed, as well as the sequence of phase transitions during charge and discharge of the electrodes in molten salt elecctrolytes at temperatures of around 4000 C to 4500 C. DOE

N84-11409# Sandia Labs., Albuquerque, N. Mex.

EFFECT OF ENVIRONMENT AND MATERIALS PROPERTIES ON THE FRICTION AND WEAR BEHAVIOR OF PRECIOUS METAL ELECTRICAL CONTACT ALLOY COUPLES

L. E. Pope and R. W. Rohde 1983 6 p refs Presented at the 29th Ann. Holm Conf. on Elec. Contacts, Chicago, 26 Sep. 1983

(Contract DE-AC04-76DP-00789)

(DE83-010403; SAND-82-2770C; CONF-830904-1) Avail: NTIS HC A02/MF A01

The friction and wear behavior of the gold-base (ASTM E541) and palladium-base (ASTM B540) alloy couple was investigated in three environments as a function of the metallurgical state of the alloys. The microstructures and hardnesses of the alloys were varied by age-hardening heat treatments and/or cold rolling. Friction and wear measurements were made with a pin-on-disc configuration with the palladium alloy serving as the pin and the gold alloy acting as the plate. The poorest friction performance was found in the helium environment where both magnitudes and break-in characteristics varied extensively. The friction coefficient varied from 0.25 to 2.0; the variation for a specific pin-plate material differences, except for cold-rolled plates which had the worst performance. The poor performance in helium is compared with improved performance in the oxygen containing atmospheres where friction coefficients ranged from 0.1 to 0.25. In oxygen containing environments, the break-in was minimal and reproducible. DOE

N84-11410# Los Alamos Scientific Lab., N. Mex. Electronics Div.

InP:Fe PICOSECOND PHOTOCONDUCTORS

R. B. Hammond, R. S. Wagner, and N. G. Paulter 1983 6 p refs Presented at the 27th Ann. Intern. Tech. Symp. on High Speed Photography, Videography and Photonics, San Diego, Calif., 21 Aug. 1983

(Contract W-7405-eng-36)

(DE83-015237; LA-UR-83-1897; CONF-830874-10) Avail: NTIS HC A02/MF A01

The impulse response of InP:Fe photoconductors to mode locked dye laser excitation was measured. Bias, excitation, and Fe concentration dependence of the impulse response are reported. Linearity of response over two decades in both bias and excitation and independence of transient response pulse width to both bias and excitation is demonstrated. Correlation is observed between Fe concentration and transient response pulse width. Finally, optical electronic autocorrelation of impulse response consistent with the sampling oscilloscope measurements is reported. DOE

N84-11411# Sandia Labs., Albuquerque, N. Mex.

SIMPLE IDEAL GAS MODEL OF THE PAVLOVSKII HIGH-EXPLOSIVE OPENING SWITCH

T. J. Tucker Aug. 1983 24 p refs

(Contract DE-AC04-76DP-00789)

(DE83-016630; SAND-83-1325) Avail: NTIS HC A02/MF A01

The behavior of the Pavlovskii type high-explosive opening switch is modeled using an ideal gas formulation. It is shown that this simple 1 dimensional model agrees with experiment during early arc compression but that at later times the process exhibits a more complex behavior, resulting from turbulent mixing. DOE

N84-11412# Sandia Labs., Albuquerque, N. Mex. Div. 2113.

GLOBAL WIRING STRATEGY FOR IC AND PC ROUTING

John A. Wisniewski and Jack A. Hudson 1983 5 p refs Presented at the IEEE Intern. Conf. on Computer-Aided Design, Santa Clara, Calif., 12 Sep. 1983

(Contract DE-AC04-76DP-00789)

(DE83-009934; SAND-83-0739C; CONF-830903-1) Avail: NTIS HC A02/MF A01

A global (topological) router is presented which can be used for both custom IC routing and PC (gate array) routing. It is based on a graph theoretical model and effectively models both wire length and area figures of merit. DOE

N84-11413# Siemens A.G., Erlangen (West Germany). Fachgebiet Kunststoffe und Elektrochemie.

ELECTROCHEMICAL-TREEING (ECT) STRUCTURES IN HIGH-VOLTAGE CABLE INSULATION Final Report, Jan. 1981

Hans-Joachim Henkel, Norbert Mueller, Wilfried Kalkner, Helga Hans, Gerhard Sander, Rainer vanOlshausen (Technische Hochschule, Hanover), and Ulrich Vogel (Technische Hochschule,

Hanover) Bonn Bundesministerium fuer Forschung und Technologie May 1983 109 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-087; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22,90

Dyeing and microscope techniques were used to study the influence on ECT conditions of the type of insulation and of the crosslinking technique. The ECT-structures produced under laboratory conditions resembled those found in cables after years of service. Results show that stressing field strength has an accelerating influence. Frequency, type of electrolyte and conductor material have no influence. The moisture content of the insulation and of the surroundings influence the growth of ECT-structures. The electrical breakdown strength of PE- and XLPE-insulated model cables decreases with duration of water immersion and of electrical prestressing. Author (ESA)

N84-11414# Technische Hochschule, Aachen (West Germany). Inst. fuer Halbleitertechnik.
EXPERIMENTAL AND THEORETICAL STUDIES OF ELECTRON BEAM LITHOGRAPHY FOR THE FABRICATION OF SEMICONDUCTOR CIRCUITS WITH SUBMICRON DIMENSIONS: WATER DISTORTION, COMPARISON OF RESULTS Final Report, Mar. 1981
Dietrich Stephani, Ernst Kratschmer, and Norbert Gellrich Bonn Bundesministerium fuer Forschung und Technologie May 1983 122 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-088; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25,60

The fabrication of structures with submicron dimensions by electron beam lithography is described. Accurate delineation is achieved by adjustment of the exposure dose to correct for proximity effects, at least for structures $>$ 0.5 micron. Overlay accuracy down to 0.1 micron was demonstrated. Anisotropic dry etching was used for the transfer of submicron resist structures into underlying layer without loss of dimensional control. No plastic wafer distortion could be demonstrated. Elastic wafer distortion resulting from grown or deposited layers can be calculated and may be taken into consideration in mask fabrication. With standard processing wafer distortion is $<$ 1 micron per 5 cm distance at the wafer surface. Author (ESA)

N84-11415# Valvo G.m.b.H., Hamburg (West Germany).
FURTHER DEVELOPMENT IN ELECTRON BEAM LITHOGRAPHY Final Report, Apr. 1982
Wolfgang Doerner, Juergen Kaeker, Ralf Kastmann, Jan Lueckert, and Manfred Schwarz Bonn Bundesministerium fuer Forschung und Technologie May 1983 74 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-099; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,60

Electron beam lithography for VLSI semi-conductor circuits is discussed. Hardware and software changes on an electron beam pattern generator are described. Research on mask processes and computer aided circuit manipulation result in higher mask throughput. Author (ESA)

N84-11416# Konstanz Univ. (West Germany). Fakultaet fuer Chemie.
THE SODIUM SULFUR BATTERY SYSTEM: INVESTIGATION OF THE SOLID ELECTROLYTE BETA ALUMINA Final Report, Dec. 1980
Juergen Felsche Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 18 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-123; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4

Optimization procedures for the synthesis of beta alumina electrolyte ceramics are treated. Solid phases organized in the microstructure of the electrolyte and the corresponding stability of the ceramics against atmospheric attacks of H2O and CO2 were investigated. Thermoanalytical and X-ray diffraction studies of MgO- and Li2O-stabilized beta alumina samples demonstrate severe problems in the technological approach to synthesize pure MgO stabilized electrolyte ceramics of compositions 1Na2O.1MgO.5Al2O3 due to beta-alumina type phase Na2MgAl10O17. Monophasic beta-alumina type ceramic has the highest stability against atmospheric attack by H2O and CO2. Small variations in stoichiometry or in the temperature/time program of synthesis induce unwanted phases. Author (ESA)

N84-11417# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Elektronische Bauelemente.
DEVELOPMENT OF TECHNOLOGIES FOR HIGHLY INTEGRATED CIRCUITS Final Report, Apr. 1981
Juergen Arndt, Peter Conze, and Gerd Sixt Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 139 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-142; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

Adding of 3% HCl to O2 as atmosphere for oxidation and standby in the gate oxidation step of n-channel metal oxide semiconductors (NMOS) is discussed. A compatible double layer polysilicon technology for nonvolatile memories was developed. Programming with hot electrons, erasing by Fowler-Nordheim tunneling, single programming voltage of + 29V, number of programming cycles $>$ 10 000, charge retention time 10 years, and integration of random logic constituted the main features. For transfer of small patterns a reactive ion etching process for SiO2 with Shipley AZ 1470 was developed. A two step process results in acceptable selectivity and resolution of two microns using projection printing. Improvement of poly-mono-insulation is achieved. Author (ESA)

N84-11418# AEG-Telefunken, Ulm (West Germany). Forschungsinst.
MONOLITHIC INTEGRATED ANALOG SWITCHING ARRAYS Final Report, Apr. 1981
Erich Baechle, Juergen Hersener, Juergen Koehne, Max Kuisl, Klaus Schlueter, and Anton Stuermer Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 183 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-146; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, DM 35

The reduction of the chip area of low ON-resistance transistor switches in n-channel metal oxide semiconductor-Si-gate technology to obtain higher density of monolithic integrated analog switching arrays is outlined. The applicability of the scaling principle, the reduction of the gate poly-Si line width and the use of a double diffusion process were studied. Transistor switches with two micron channel length obtained by reduced width of the gate poly Si lines show good transmission properties for crosspoint applications in telephone exchange systems. A 5 x 6 switching array was designed by applying double metal layer wiring. Special care was taken to avoid or compensate parasitic capacitances caused by the double layer wiring and the dual in line package leads. Author (ESA)

N84-11419# Accumulatorenfabrik Sonnenschein G.m.b.H., Buedingen (West Germany).
DEVELOPMENT OF MAINTENANCE-FREE LEAD BATTERIES Final Report, Apr. 1981
Gerhard Miltenberger Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 127 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und

Technologie
(BMFT-FB-T-83-150; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

Dryfit technology with gel electrolyte applied to starting batteries is presented. Higher charging efficiency and lower self-discharge rate were searched for. Energy- and performancedensity of active paste were investigated. The behavior of alloys with respect to corrosion, electrochemical production processes, as well as charging methods on closed tubular-plated batteries in dryfit technology were examined. Advantages include no topping up; recharge if out of use every 12 to 18 months instead of 3 months; and storage possibility low charge. A series of tubular plated and grid plated batteries (63, 110 and 160 Ah) was marketed. Author (ESA)

N84-11420# Factory Mutual Research Corp., Norwood, Mass.
COMBUSTIBILITY OF ELECTRICAL WIRE AND CABLE FOR RAIL RAPID TRANSIT SYSTEMS. VOLUME 1: FLAMMABILITY Final Report, Apr. 1981 - Apr. 1982
A. Tewarson, M. M. Khan, and J. Steciak May 1983 120 p refs 2 Vol.
(Contract DTRS57-80-C-00073)
(PB83-233742; DOT-TSC-UMTA-83-4.1-Vol-1; UMTA-MA-06-0025-83-6-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 13F

The flammability of wires and cables used in rapid rail transit systems was examined to quantify the fire properties of wires and cables in a manner so that the relative fire hazards could be assessed under various fire scenarios expected in rapid rail systems. The following items were investigate: a literature review of wire and cables fires; selection of test method for combustibility evaluations of wires and cables; testing of wires and cables; and evaluation of ranking of wires and cables. An overall summary, experimental details, results and discussion, and appendices providing detailed calculations for determining the different parameters used are presented. GRA

N84-11421# Civil Aeromedical Inst., Oklahoma City, Okla.
COMBUSTIBILITY OF ELECTRICAL WIRE AND CABLE FOR RAIL RAPID TRANSIT SYSTEMS. VOLUME 2: TOXICITY Final Report
C. B. Crane, D. C. Sanders, B. R. Endecott, and J. K. Abbott May 1983 52 p refs 2 Vol.
(DOT-TSC-UMTA-83-4.2-Vol-2; UMTA-MA-06-0025-83-7-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 13F

The relative inhalation toxicity of the gases produced by thermal degradation of selected electrical insulation materials was determined. Six electrical wiring insulation materials were supplied by Factory Mutual Research and were evaluated for the toxic potential of their combustion products using the procedure developed at the Civil Aeromedical institute (CAML). Each of the materials was tested under flaming conditions at 750C with hot-wire ignition, and under nonflaming conditions at 550C. The work described in this report was performed between December 1981 and March 1982, and it consists of test criteria, animal response data, and a relative ranking of six insulation materials on the basis of the relative inhalation toxicity of their thermal degradation products. GRA

N84-11338# Joint Publications Research Service, Arlington, Va.
AVT 110 AUTOMATIC MULTIPLE PROBE TESTER DESCRIBED
In its East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 5-8 Transl. into ENGLISH from Inf. (West Germany) p 1-6 (For primary document see N84-11336 02-31) Avail: NTIS HC A03

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N84-11422 Minnesota Univ., Minneapolis.
EFFECT OF PERIODIC, TAPERED ENLARGEMENTS AND CONTRACTIONS ON TURBULENT HEAT TRANSFER AND FLUID FLOW IN A CIRCULAR DUCT Ph.D. Thesis
Paulo Roberto DeSouzaMendes 1982 186 p
Avail: Univ. Microfilms Order No. DA8308037

Heat transfer coefficients, pressure drop data and fluid flow patterns were determined experimentally for turbulent flow in circular ducts characterized by periodic tapered enlargements and contractions of cross section. Fully developed and entrance region results were obtained. The effects of the taper angle, cycle length and Reynolds number were investigated. The Reynolds number ranged from 6,000 to 70,000, whereas the half taper angle was varied in the range 2 to 14.8 deg. The two half cycle lengths investigated were respectively 0.762 and 1.143 times the diameter of the largest cross section. Flow visualization experiments showed that for the half taper angles of 6.3, 10 and 14.8 deg., flow separation and recirculation occur in the duct, primarily in the diverging sections. For smaller angles, no backflow was detected. The friction factor for the periodic geometries was found to be always larger than that for the straight pipe at the same Reynolds number, increasing rapidly with the taper angle as well as with the cycle length, and decreasing with Re. Dissert. Abstr.

N84-11423 Brown Univ., Providence, R. I.
FINITE ELEMENT SIMULATION OF VISCOELASTIC FLOWS Ph.D. Thesis
Montri Viriyayuthakorn 1982 127 p
Avail: Univ. Microfilms Order No. DA8228349

A finite element simulation was carried out for a viscoelastic fluid of the single integral, memory type. The memory kernel is chosen to be a single exponential in the time lapse (Maxwell model). However, the formulation is such that it can easily be generalized to more realistic models such as the BKZ theory. From the point of view of numerical analysis differential models are appealing because they avoid the complexities of memory integrals. However, in these models the viscoelastic effect always enters through terms having the highest order derivatives. In a memory integral formulation the demand on differentiability of the velocity field is not greater than for the Newtonian fluid. The basic idea in the formulation is the approximation of the memory integral by a Laguerre numerical quadrature formula. The kinematical problem is the computation of the displacement vector from every node to the Laguerre points upstream along particle paths. Dissert. Abstr.

N84-11424 Mississippi State Univ., Mississippi State.
AN ANALYTICAL AND EXPERIMENTAL STUDY OF SPECTRAL ANALYSIS TECHNIQUES FOR TURBULENCE DATA OBTAINED USING LASER VELOCIMETRY Ph.D. Thesis
Dandinasivara Venkateshaiah Srikantaiah 1982 151 p
Avail: Univ. Microfilms Order No. DA8307462

Two spectral analysis techniques - the correlation method of Mayo, et. al., and the direct transform method of Gaster and Roberts - were evaluated for use in making spectral estimates from randomly-sampled random data (such as turbulence data obtained with an individual realization laser Doppler velocimeter (LDV)). The effect of 'bad' points (which usually appear randomly in actual LDV data sets) on the spectral estimates has been studied. Necessary modifications and extensions to the techniques have been determined based on studies using simulated data with known spectral characteristics. Both techniques were used for spectral analysis of laser Doppler velocimeter measurements taken in a

simulated coal-fired magnetohydrodynamic flow field.
Dissert. Abstr.

N84-11425 Brown Univ., Providence, R. I.
A FINITE ELEMENT ANALYSIS OF THE UPPER JET REGION OF A FIBER DRAWING FLOW FIELD Ph.D. Thesis
Richard Edmund Sayles, Jr. 1982 196 p
Avail: Univ. Microfilms Order No. DA8228330

A heat transfer model is developed to analyze the upper jet region of a fiber drawing flow field. This region is characterized by fully two diminsional fields and a large change in the radius of the jet. Because of these and other analytic complexities such as viscous dissipation, temperature-dependent viscosity, the determination of the free surface shape of the jet, gravity, inertia, and surface tension forces; the upper jet region is analyzed by the finite element method. A boundary layer theory is presented which accounts for the stretching jet surface. The Karman-Pohlhausen momentum-integral technique is used with an assumed velocity profile motivated by the shearing flow between two concentric cylinders in relative axial motion. A stretching jet surface imposes on the boundary layer a development which is distinct from that which is normally encountered on a constant radius cylinder. Reynolds' analogy is assumed for the calculation of convective heat transfer from the jet to an air boundary layer.
Author

N84-11426# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.
THE 80-MICRON PARTICLE ACCELERATION IN AN EXPANDING GAS SUPPLEMENT
Siegfried H. Hasinger Jun. 1983 18 p refs
(AF Proj. 2404)
(AD-A130991; AFWAL-TR-81-3105-Suppl) Avail: NTIS HC A02/MF A01 CSCL 20/7

In a previous Report a new method had been introduced to calculate the flow with heat loss and friction in expansion nozzles. This method has now been improved, leading to somewhat more favorable results for the performance prediction of these nozzles. Derivations for the improved method and new calculation results are given in this Supplement.
GRA

N84-11427# Army Missile Command, Redstone Arsenal, Ala. Systems Simulation and Development Directorate.
COMPBL-II: COMPRESSIBLE, VARIABLE PRESSURE BOUNDARY LAYER PROGRAM FOR ARBITRARY GASEOUS MIXTURES
T. A. Antoon and B. J. Walker Oct. 1981 37 p refs
(AD-A131352; AD-E950416; DRSMI/RD-82-2-TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

A code has been written to calculate the boundary layer over a body for a compressible, variable pressure flow with an arbitrary gaseous mixture. This code was written to handle internal flows as well as external flows. For this reason, combustion gases at elevated temperatures are of interest and are treated. The boundary layer equations are solved using an integral technique.
Author (GRA)

N84-11428# TRW, Inc., Redondo Beach, Calif.
ENHANCED COMPRESSIBLE FLUIDS INVESTIGATION Final Report
C. Gustavson and Robert Dombroski Dover, N.J. Army Armament R&D Command Apr. 1983 47 p refs
(Contract DAAK10-81-C-0334)
(AD-A131622; AD-E401000; ARLCD-CR-83008) Avail: NTIS HC A03/MF A01 CSCL 19/6

This report describes a continuing investigation of compressible fluids for use in artillery recoil mechanisms. (See Contractor Report ARLCD-CR-81034 for results of the previous investigation.) Several candidate fluids, those exhibiting higher compressibility than Dow Corning DC-200, were examined more thoroughly. Tradeoff analyses were performed and an optimum fluid is recommended. Fluid, recoil mechanism, seal compatibility, and the effects of solubilized gases were investigated. The possibility of using microballoons in a recoil fluid was examined. Results indicate that perfluorinated ether provides improved compressibility but has drawbacks such as lower viscosity and a lower boiling point. GRA

N84-11429# Alabama A & M Univ., Normal. Dept. of Physics and Mathematics.
HIGH REYNOLDS NUMBER CYLINDER FLOW STUDIES Final Report, May 1981 - Oct. 1982
M. C. George 10 Jan. 1983 84 p
(Contract N00014-81-K-0479)
(AD-A131116) Avail: NTIS HC A05/MF A01 CSCL 20/4

This document contains a description of a series of wind tunnel tests conducted in the NASA-Ames 12-foot pressurized wind tunnel. Experiments were conducted on smooth and rough cylinders at Reynolds numbers that ranged from 10,0000 to 70,00000. Roughnesses were obtained by using four sizes of wire mesh to cover the smooth cylinder. Sample results are included, but the complete data set is the subject of a forthcoming report.
Author (GRA)

N84-11430# Los Alamos Scientific Lab., N. Mex.
FLOW-THROUGH BOUNDARY CONDITIONS FOR TIME-DEPENDENT, BUOYANCY-INFLUENCED FLOW SIMULATIONS USING LOW ORDER FINITE ELEMENTS
John M. Leone, Jr., Philip M. Gresho, Robert L. Lee, and Robert L. Sani (Colorado Univ.) 1983 12 p refs Presented at the 3rd Intern. Conf. on Numerical Methods in Laminar and Turbulent Flow, Seattle, 8-11 Aug. 1983
(Contract W-7405-eng-48)
(DE83-010256; UCRL-88103; CONF-830803-9) Avail: NTIS HC A02/MF A01

Two methods are presented to extend the utility of outflow natural boundary conditions from isothermal flows to those in which an additional vertical pressure gradient, associated with buoyancy-influenced flows, is important. Each of these methods approximates the pressure contribution to the natural boundary conditions in a time-dependent way. The methods are derived and demonstrated in two-dimensions and the extension to three-dimensions is discussed.
DOE

N84-11431# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
RAFT THERMOCLINE THERMAL STORAGE
Robert Copeland and James Green May 1983 7 p refs Presented at the 18th Intersoc. Energy Conversion Eng. Conf., Orlando, Fla., 21-16 Aug. 1983
(Contracts DE-AC02-77CH-00178; EF-77-C-01-4042)
(DE83-011962; SERI/TP-252-1969; CONF-830812-28) Avail: NTIS HC A02/MF A01

A raft thermocline thermal storage system consists of an insulated platform floating between the hot and cold regions of a liquid in a storage tank. Experiments were conducted to evaluate the raft's stability and effectiveness in delivering thermal energy. Water was employed as the storage fluid. The effects of inlet orientation (side, tangential, or vertical), flow rate, and raft insulation were measured and compared with a natural thermocline. The raft thermocline's effectiveness in achieving a thermal separation of the fluid was measured, and the critical Richardson number was found to be significantly different from that of natural thermoclines. The raft thermocline's effectiveness was equal to or better than that of a natural thermocline at all flow conditions.
DOE

N84-11432# Los Alamos Scientific Lab., N. Mex.
NUMERICAL SIMULATION OF THE COUNTERCURRENT FLOW IN A GAS CENTRIFUGE
L. D. Cloutman and R. A. Gentry Mar. 1983 22 p refs
(Contract W-7405-eng-36)
(DE83-013323; LA-8972-MS) Avail: NTIS HC A02/MF A01

A finite difference method for the numerical simulation of the axisymmetric countercurrent flow in a gas centrifuge is presented. A time-marching technique is used to relay an arbitrary initial condition to the desired steady-state solution. All boundary layers

can be resolved, and nonlinear effects may be included. Numerical examples are presented. It is concluded that this technique is capable of predicting accurately the performance of a wide variety of machines under all operating conditions of interest. DOE

N84-11433# Los Alamos Scientific Lab., N. Mex. Chemistry Div.

SINGLE-PULSE COHERENT RAMAN SPECTROSCOPY IN SHOCK-COMPRESSED BENZENE

David S. Moore, S. C. Schmidt, D. Schiferl, and J. W. Shaner 1983 9 p refs Presented at the 9th AIRAPT Conf., Albany, 25-29 Jul. 1983

(Contract W-7405-eng-36)

(DE83-014140; LA-UR-83-1854; CONF-830763-1) Avail: NTIS HC A02/MF A01

Single-pulse backwards stimulated Raman and reflected broadband coherent anti-Stokes Raman spectroscopy (BSRC and RBBCARS) were used to measure the vibrational frequenncy shifts of the 992 cm(+1) ring-stretching mode of liquid benzene shock-compressed to pressures up to 1.2 GPa. The resulting shifts of approx. 7.5 cm(+1)/GPa in the dynamic experiments are compared to spontaneous Raman-scattering measurements of heated samples compressed in a diamond-anvil cell. RBBCARS was used to simultaneously measure the ring-stretching mode vibrational frequencies of liquid benzene/liquid perdeuterobenzene mixture shock-compressed to pressures up to 1.53 GPa. Additional experiments that demonstrate the difficulty of using polarization-sensitive coherent Raman techniques, such as Raman-induced Kerr effect spectroscopy (RIKES), in shock-compressed samples are described DOE

N84-11434# Nevada Univ., Las Vegas. Water Resources Center.

AN ANALYSIS OF THE ANNUAL TEMPERATURE WAVE PROPAGATING THROUGH AN ALLUVIAL SOIL

Thomas F. Panian Mar. 1983 27 p refs

(Contract DE-AC08-81VN-10162)

(DEL83-014883; DOE/NV-10162/4) Avail: NTIS HC A03/MF A01

The physical processes by which heat is transferred through a soil depend upon the mineral, organic matter, and moisture contents of the soil and physical parameters as porosity and bulk density were analyzed. Heat transfer has a strong effect on matric potential in an unsaturated soil and on the movement of water and impurities. In dry, relatively homogeneous soils conduction is the dominant mode of heat transfer. Under these conditions, the Fourier equation of heat conduction in a semi-infinite solid body with a constant thermal diffusivity can be used. A cosine wave solution of the Fourier equation is presented which describes temperature as a function of both depth and time. Annual temperature waves recorded at several depths in an alluvial soil were modeled using a least squares estimate based on the cosine function. It is found that the amplitudes and phase angles of the models vary with depth in the same manner as described by the solution to the Fourier equation. It is concluded that this solution describes the propagation of the actual annual temperature wave and thus the thermal diffusivity of the soil can be estimated. DOE

N84-11435# Oak Ridge National Lab., Tenn. Energy Div.

VERTICAL CONCENTRIC-TUBE GROUND-COUPLED HEAT EXCHANGERS

V. C. Mei and S. K. Fischer 1983 39 p refs Presented at the Semiannual ASHRAE Meeting, Atlantic City, Jun. 1983

(Contract W-7405-eng-26)

(DE83-014003; CONF-830663-1) Avail: NTIS HC A03/MF A01

The design of vertical, concentric tube ground coupled heat exchangers for use in heat pump applications is described. The experimental apparatus consists of a concentric configuration of two 47.7-m PVC pipes with instrumentation to measure heat transfer. This heat exchanger was placed in a 0.20-m inside diameter well and backfilled with sand to establish good thermal contact. Heat transfer was measured for heat exchanger operation under several sets of operating conditions. A mathematical model was developed and converted into an ANSI standard FORTRAN IV computer program to simulate the operation of the ground coupled heat exchanger. Data collected using the experimental apparatus was used to validate the computer program, and the computer model was then used to study the effects of variations in heat exchanger length, diameter, flow rate, and thermal conductivity and the thermal conductivity of the ground on the heat exchanger performance. DOE

N84-11436# General Atomic Co., San Diego, Calif.

ACOUSTIC RESONANCE IN HEAT-EXCHANGER TUBE BANKS Annual Report

R. D. Blevins Mar. 1983 155 p refs

(Contract DE-AT03-82ER-12023; GA Proj. 3384)

(DE83-011413; GA-A-17013; AR-1) Avail: NTIS HC A08/MF A01

The fluid mechanics of acoustic resonance in heat exchanger tube bundles was studied. Three phases of work were performed: (1) review of data and theory; (2) development of a model for the acoustics of tube bundles; and (3) construction of a tube bundle wind tunnel and a tube array model. The review indicates that there are no predictive tools or experimental measurements of acoustic damping in tube bundles or of acoustic mode shape with flow. The acoustic model provides these predictors, which will be compared with measurements in the wind tunnel. A nonlinear, fluid dynamic model for vortex shedding will be developed to provide a fluid mechanics forcing function for the acoustic model. DOE

N84-11437# California Univ., Livermore. Lawrence Livermore Lab.

SHOCKED FLUIDS AT HIGH DENSITIES AND TEMPERATURES

W. J. Nellis 12 Jul. 1983 12 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18-21 Jul. 1983

(Contract W-7405-eng-48)

(DE83-015901; UCRL-89599; CONF-830719-34) Avail: NTIS HC A02/MF A01

Applications for the properties of dense molecular fluids at high pressures and temperatures are described: the equation of state of reacted high explosives, modeling the interiors of the outer planets, and hydrodynamic uses. Experimental techniques are described for shock-wave equation-of-state, shock temperature, and electrical conductivity experiments for liquid specimens. Experimental data are reviewed and discussed in terms of the phenomena that occur at high densities and temperatures in shocked Ar, N2, D2, He, Xe, H2O, and C6H6. DOE

N84-11438# Sandia Labs., Albuquerque, N. Mex. Fluid Mechanics and Heat Transfer Div.

SAGUARO: A FINITE-ELEMENT COMPUTER PROGRAM FOR PARTIALLY SATURATED POROUS FLOW PROBLEMS

Roger R. Easton, David K. Gartling, and Don E. Larson 9 Nov. 1983 121 p

(Contract DE-AC04-76DP-00789)

(DE83-015603; SAND-82-2772) Avail: NTIS HC A06/MF A01

SAGUARO is finite element computer program designed to calculate two-dimensional flow of mass and energy through porous media. The media may be saturated or partially saturated. SAGUARO solves the parabolic time-dependent mass transport equation which accounts for the presence of partially saturated zones through the use of highly non-linear materatial characteristic curves. The energy equation accounts for the possibility of partially saturated regions by adjusting the thermal capacitances and thermal conductivities according to the volume fraction of water present in the local pores. Program capabilities, user instructions and a sample problem are presented in this manual. DOE

N84-11439# Battelle Memorial Inst., Columbus, Ohio. Office of Nuclear Waste Isolation.

USER'S MANUAL FOR SPECTROM-41: A FINITE-ELEMENT HEAT TRANSFER PROGRAM

Darrel K. Svalstad Jun. 1983 183 p refs
(Contracts DE-AC06-76RL-01830; DE-AC02-83CH-10140)
(DE83-014809; ONWI-326) Avail: NTIS HC A09/MF A01

This User's Manual addresses SPECTROM-41: A Finite Element Heat Transfer Computer Program. The user is introduced to the program's capabilities and operation, with required user input outlined in detail. Example problems are included to illustrate the of the various program features, and included to illustrate the use of the various program feastures, and analytical solutions are presented for four of the examples to provide a measure of program accuracy. Past and ongoing comparative benchmark analyses are highlighted to provide the user with an indication of how SPECTROM-41 predictions compare with other available heat transfer programs. DOE

N84-11440# E-Tech, Inc., Atlanta, Ga.
DEVELOPMENT OF A SOLAR-DRIVEN FREE-PISTON HEAT PUMP Final Report
[1982] 111 p refs
(Contract DE-AC02-77CS-34539; ED-77-C-02-4539)
(DE83-015024; DOE/CS-34539/1) Avail: NTIS HC A06/MF A01

A proprietary free-piston-expander-compressor device for a dual-loop Rankine-cycle-driven vapor-compression-cycle heat-driven heat pump has been analyzed which is uniquely suited for varying low-temperature heat sources such as flat-plate solar collectors. Its unique characteristics are due to two properties. One is its low mechanical friction with only piston ring to cylinder friction being present. Piston side forces with its associated friction and other bearing friction surfaces are not present. The other unique property is that for any pressure ratios, (i.e., boiler pressure to condenser pressure and evaporator pressure to condenser pressure), throttling losses across the valves due to off-design operation are not present. Analysis has been carried out to determine piston velocities, cycle times, valve loss effects, and piston-ring friction effects. Operating pressure limits have also been calculated. These results show Refrigerant 114 to be a good choice as a working fluid. DOE

N84-11441# Los Alamos Scientific Lab., N. Mex.
THREE-DIMENSIONAL COMPUTER MODELING OF A SHOCK-RECOVERY EXPERIMENT
R. L. Rabie, J. E. Vorthman, and J. K. Dienes 1983 5 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18 Jul. 1983
(Contract W-7405-eng-36)
(DE83-015915; LA-UR-83-2138; CONF-830719-21) Avail: NTIS HC A02/MF A01

An ideal shock recovery experiment would be to subject a sample material to a single, well-defined shock followed by a controlled, benign release of the stresses and velocities generated. The process should be such that any change found in the sample after recovery could be attributed to the shock process alone. In any real experiment with finite-sized samples, rarefaction waves are generated at the edges of the sample. In general these rarefaction waves can have a large effect on the sample, which is impossible to separate from the effects of the shock alone. It has been suggested that samples of certain shapes will have a small region in their interiors, which is substantially free from the effects of edge rarefactions. Results of three-dimensional computer calculations done to test this hypothesis are presented. Thin square plates and thin star-shaped plates are considered. DOE

N84-11442# Los Alamos Scientific Lab., N. Mex. Dynamic Testing Div.
MACH DISC FORMATION IN CYLINDRICAL RECOVERY SYSTEMS
C. E. Morris, R. G. McQueen, and S. P. Marsh 1983 5 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N.Mex., 18-21 Jul. 1983
(Contract W-7405-eng-36)
(DE83-015912; LA-UR-83-2181; CONF-830719-14) Avail: NTIS HC A02/MF A01

Cylindrical recovery systems are used to shock-load polymers to pressures exceeding 50 GPa. In order to determine the pressures generated in these recovery systems the formation of the mach disc on axis and its approach to steady state was monitored. The relation of the Mach disc diameter to the lateral dimension of the high explosive used to compress the polymer samples was also investigated. DOE

N84-11443# Sandia Labs., Albuquerque, N. Mex. Thermo-mechanical and Physical Div. prs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N.Mex., 18-21 Jul. 1983
REFRACTIVE INDEX AND EQUATION OF STATE OF A SHOCK-COMPRESSED AQUEOUS SOLUTION OF ZINC CHLORIDE
J. L. Wise 1983 4 p refs
(Contract DE-AC04-76DP-00789)
(DE83-016302; SAND-83-0854C; CONF-830719-30) Avail: NTIS HC A02/MF A01

Velocity interferometers measurements have yielded refractive index and Hugoniot equation-of-state data for a 9.1-molar aqueous solution of zinc chloride which was shock-compressed to initial stresses ranging from 2.2 to 24.1 GPa in a series of plate-impact experiments. The Hugoniot data are accurately described by a linear variation of shock velocity with particle velocity. The optical data verify sustained solution transparency over the investigated range of shock stresses, and provide a calibration of the correction which must be applied to interferometer measurements to account for the stress-induced change in refractive index of the material. Refractive index data derived from the measured particle velocity corrections exhibit a departure from predictions based on the Gladstone-Dale relation. DOE

N84-11444# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
THE INFLUENCE OF COMBUSTION ON REYNOLDS STRESS IN A STRONGLY HEATED TURBULENT BOUNDARY LAYER
R. K. Cheng and T. T. Ng (Notre Dame Univ., Ind.) Jun. 1983 28 p refs Presented at the 21st Natl. Heat Transfer Conf., Seattle, 25 Jul. 1983
(Contract DE-AC03-76SF-00098)
(DE83-015524; LBL-16297; CONF-830702-22) Avail: NTIS HC A03/MF A01

Conditional Reynolds stress statistics in a reacting turbulent boundary layer over a strongly heated wall were obtained using two color laser Doppler anemometry technique. Quadrant analysis of the data showed that the reduction in Reynolds stress due to combustion was caused by a decrease in contribution from the bursting event. DOE

N84-11445# Oak Ridge National Lab., Tenn. Computer Sciences Div.
SIMULTANEOUS HEAT AND MASS TRANSFER IN ABSORPTION OF GASES IN TURBULENT LIQUID FILMS
Gershon Grossman and Michael T. Heath Jul. 1983 42 p refs
(Contract W-7405-eng-26)
(DE83-016394; ORNL/TM-8503) Avail: NTIS HC A03/MF A01

A theoretical analysis of the combined heat and mass transfer process taking place in the absorption of a gas or vapor into a turbulent liquid film is described. Eddy diffusivity correlations were used to describe the transport near the wall and the interface and in the bulk of the film. The energy and diffusion equations are solved simultaneously to give the temperature and concentration variations in the film. Two cases of interest are considered: a constant-temperature and an adiabatic wall. The Nusselt and Sherwood numbers are expressed in terms of the operating parameters, from which heat and mass tranfer coefficients are determined. DOE

N84-11446# Los Alamos Scientific Lab., N. Mex.
THE VELOCITY OF SOUND BEHIND STRONG SHOCK WAVES IN 2024 AL
R. G. McQueen, J. N. Fritz, and C. E. Morris 1983 5 p refs Presented at the Am. Phys. Soc. Topical Meeting on Shock Waves in Condensed Matter, Santa Fe, N. Mex., 18-21 Jul. 1983

(Contract W-7405-eng-36)
(DE83-015927; LA-UR-83-2269; CONF-830719-20) Avail: NTIS HC A02/MF A01

Rarefaction waves were produced by impacting a target with a thin plate. An optical technique was used to determine where the rarefaction from the back surface of the impactor overtook the shock wave induced in a step wedge target. Bromoform was placed on the front surface. When the shock reached the liquid it radiated steadily the rarefaction from the impactor overtakes it. The times when this occurred were used to determine where the rarefaction just overtook the shock in the target, and thus the sound velocity. The leading edge of this rarefaction wave travels at longitudinal sound velocity in solids. This velocity increases smoothly with pressure until shock heating causes the material to melt. The data indicate that melting on the Hugoniot of 2024 Al begins at about 125 GPa and is completed at 150 GPa. DOE

N84-11447# Technische Hochschule, Aachen (West Germany). Inst. fuer Strahlantriebe und Turboarbeitsmaschinen.
INVESTIGATION OF TWO-COMPONENT TWO-PHASE CHANNEL FLOW WITH HEAT SUPPLY FOR APPLICATION IN INSIDE COOLED TURBINE BLADES Final Report [UNTERSUCHUNG DER ZWEIKOMPONENTEN-ZWEIPHASEN-KANALSTROEMUNG MIT WAERMEZUFUHR IM HINBLICK AUF DIE ANWENDUNG AN INNENGEKUEHLTEN TURBINENSCHAUFEIN]
U. Dreyer Oct. 1982 59 p refs In GERMAN
(Contracts DFG-Da-64/22; DFG-Da-64/26; DFG-Da-64/28)
Avail: NTIS HC A04/MF A01

The cooling efficiency of a water-air mixture in turbines was investigated. A one-dimensional phase separating calculation model was developed to determine the characteristics of a two-phase, two-component flow. An electrically heated flow channel for a water-air mixture was built to measure the heat transfer coefficients for different influence parameters. A considerable heat transfer increase is found with water injection. The measurements show a strongly decreasing Nusselt number along the channel, and a strongly increasing wall temperature at the end of the channel which excludes this cooling method for turbine cascades. The investigations prove the essentially higher cooling efficiency of the mixture, the quantitative determination of the heat transfer behavior, and the possibility of practical utilization. Author (ESA)

N84-11448# Bonn Univ. (West Germany). Sonderforschungsbereich 72.
ASYMPTOTIC EXPANSIONS OF THE PRESSURE AND THE FREE BOUNDARY FOR FLOWS THROUGH POROUS MEDIA
Dietmar Kroener 1983 28 p refs Submitted for publication
Sponsored by Deutsche Forschungsgemeinschaft
(Preprint-584) Avail: NTIS HC A03/MF A01

The free boundary value problem for the pressure head u of a compressible fluid flowing through a homogeneous porous medium is studied. This process is governed by the partial differential equation epsilon delta t u - delta squared x u = 0, where epsilon is proportional to the compressibility of the fluid. It is shown that the pressure as well as the free boundary converge to the corresponding stationary solutions when epsilon tends to zero. The error is estimated in terms of powers of epsilon. In the case of water, for example, if compressibility is neglected, the error can be estimated. Author (ESA)

N84-11449# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
THE KINETIC THEORY OF GASES WITH APPLICATIONS IN RAREFIED GAS DYNAMICS
Donald C. Pack Apr. 1983 131 p refs Submitted for publication
Sponsored by Deutsche Forschungsgemeinschaft
(Preprint-746) Avail: NTIS HC A07/MF A01

The molecular and continuum approaches to gas flow are summarized. The velocity distribution function, Boltzmann's equation, dynamics of encounters, collisional invariants, and the Maxwellian distribution function are outlined. The concept of mean free path, Knudsen number, free molecular flow of gas, gas-surface interactions, nearly free molecular flow, shock wave structure, moment methods, the linearized BGK model equation, and the kinetic theory of jet source expansion are covered. Author (ESA)

N84-11450# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
VARIATION OF THE SIZE OF NITROGEN DROPLETS IN A FLOW OF GASEOUS NITROGEN
Barbara Schmitt-vonSchubert Mar. 1983 55 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-83-13) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 16,20

Approximate equations describing the interaction of nitrogen gas and droplets of arbitrary size were deduced, and the behavior of a small number of droplets in a uniform parallel flow was studied. Two qualitatively different cases occur. In the first case the radius of the droplets increases constantly, if in the beginning the size exceeds a certain value, determined by the temperature. Otherwise, the size decreases more and more. In both cases, however, if the gaseous nitrogen does not admit the presence of droplets, they evaporate and their size and temperature vary in a nonmonotonic way. Author (ESA)

N84-11451 Stanford Univ., Calif.
LOCAL MEASUREMENTS OF TURBULENT BOUNDARY LAYER HEAT TRANSFER ON A CONCAVE SURFACE USING LIQUID CRYSTALS Ph.D. Thesis
John Charles Simonich 1983 208 p
Avail: Univ. Microfilms Order No. DA83-07219

The goal of the current experiment was to determine whether or not there are large-scale structures visible in the distribution of heat transfer coefficient on a concave surface. The heat transfer measurements were taken using a new technique which uses cholesteric liquid crystals to determine surface temperature, in conjunction with a surface of known heat release per unit area. This technique permits an instantaneous visualization of heat transfer coefficient over a large area. The response rate of the package is high enough to include the important dynamics of the transport processes. A mixing length model for concave curvature was applied to STAN5, an existing, finite-difference computer program. This model is shown to successfully predict mean heat transfer rates in concavely curved turbulent boundary layers. It was shown that the outer-layer mixing length distribution was not an important variable in predicting heat transfer rates for water (Pr = 5). Author

N84-11452 Stanford Univ., Calif.
AN EXPERIMENTAL STUDY OF THE DYNAMICS OF AN UNSTEADY TURBULENT BOUNDARY LAYER Ph.D. Thesis
Rangarajan Jayaraman 1983 209 p
Avail: Univ. Microfilms Order No. DA83-07170

Turbulent boundary layers with a time-dependent free-stream velocity occur in many fluid dynamic devices. The main objective of the present work are as follows: (1) to understand the characteristics of a turbulent boundary layer that develops under steady, zero-pressure gradient conditions upstream, and is subjected to well-defined and sinusoidally varying adverse free-stream gradient downstream, and (2) to provide a definitive data set that would serve as a test case for evaluating the performance of calculation procedures and turbulence models for such flows. The results show that the time-averaged velocity and turbulence are insensitive to the imposed unsteadiness, while the periodic components are very strongly affected by the frequency.
Dissert. Abstr.

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N84-11453 Technische Physische Dienst TNO-TH, Delft (Netherlands). Afd. Optiek.

VISUALIZATION OF PATTERNS CORRESPONDING TO THE FOURIER COMPONENTS OF A VIBRATION BY INTERFERENCE HOLOGRAPHY [HET MET INTERFERENTIEHOLGRAFIE ZICHTBAAR MAKEN VAN PATRONEN BEHORENDE BIJ DE FOURIER-COMPONENTEN VAN EEN SAMENGESTELDE TRILLING]

R. A. Rooth and P. vanZuylen 12 May 1982 140 p refs In DUTCH; ENGLISH summary

(Contract A76/K/072)

(TPD-1982-0-1) Copyright. Avail: Issuing Activity

Two techniques were applied to visualize patterns of an object in harmonic vibration. The compensation technique for unwanted rigid body motions can be used with time-average holography, where a very narrow reference bream is led to the hologram via the object under investigation. It is possible to take time-average holograms of objects vibrating with a variable amplitude, which is impossible otherwise. The second technique is double-pulse holography. The high demands on the rigidity of the setup can then be diminished and also vibrations with more than one direction of motion and variable amplitude can be studied. To obtain reproducible results a synchronization between the mechanical vibration and the laser system is realized. It is possible to fire the light pulses in a predetermined phase of the vibration and to visualize on a metal plate the vibration pattern corresponding to one of the Fourier components from a complex vibration. Author (ESA)

N84-11454# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ADAPTATION AND ARRANGEMENTS FOR TRANSPARENCY MICROFILMING [ADAPTACOES E ARRANJOS PARA A MICROFILMAGEM DE TRANSPARENCIAS]

Andre Luiz Pinto Teixeira Aug. 1983 10 p In PORTUGUESE; ENGLISH summary Presented at the 4th Congr. Latino-Americano de Micrografica, Sao Paulo, 8-12 Aug. 1983

(INPE-2831-PRE/382) Avail: NTIS HC A02/MF A01

Some methods were developed in order to synthesize problems and to solve difficulties which occur in transparency microfilming such as the use of clear 'blips', the preparation of originals along with the microfilming operation, the manual and automatic numbering, the support and transport of originals etc. A 'smooth' processing system is shown to obtain half tone reproduction, making the final control through gray scales. The study of the polarity selection and the standard of the copies which best adapt to the user is also presented. Author

N84-11455# Research Triangle Inst., Research Triangle Park, N.C. Analytical Sciences Div.

OPTIMIZATION OF GC/MS BASED TENAX COLLECTION METHOD FOR TOXIC ORGANICS Final Report

Barbu Demian and Edo D. Pellizzari Jul. 1983 119 p refs

(Contract EPA-68-02-3423)

(PB83-229476; EPA-600/3-83-058) Avail: NTIS HC A06/MF A01 CSCL 14B

The sampling of vapor-phase organics in the presence of reactive inorganics using the Tenax gas chromatography (GC) sampling cartridge was investigated. To differentiate between pollutants in air and those formed from in situ artifact reactions, deuterated organics were employed in both laboratory and field experiments; and any subsequent artifact products were detected by capillary gas chromatography/mass spectrometry/computer techniques. Artifacts produced by Tenax GC itself and by reactions between adsorbed species were investigated using statistical methods. GRA

N84-11456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPLICATION OF LASER ANEMOMETRY IN TURBINE ENGINE RESEARCH

Richard G. Seasholtz [1982] 9 p refs Presented at the Electron. Conf., Cleveland, 4-6 Oct. 1983; sponsored by Inst. of Elec. and Electron. Engr., Inc.

(NASA-TM-83513; E-1860; NAS 1.15:83513) Avail: NTIS HC A02/MF A01 CSCL 14B

The application of laser anemometry to the study of flow fields in turbine engine components is reviewed. Included are discussions of optical configurations, seeding requirements, electronic signal processing, and data processing. Some typical results are presented along with a discussion of ongoing work. Author

N84-11457*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VIDEO MODEL DEFORMATION SYSTEM FOR THE NATIONAL TRANSONIC FACILITY

A. W. Burner, W. L. Snow, and W. K. Goad Aug. 1983 24 p refs Presented at Ann. Meeting of the Virginia Acad. of Sci.

Avail: NTIS HC A02/MF A01 CSCL 14B

A photogrammetric closed circuit television system to measure model deformation at the National Transonic Facility is described. The photogrammetric approach was chosen because of its inherent rapid data recording of the entire object field. Video cameras are used to acquire data instead of film cameras due to the inaccessibility of cameras which must be housed within the cryogenic, high pressure plenum of this facility. A rudimentary theory section is followed by a description of the video-based system and control measures required to protect cameras from the hostile environment. Preliminary results obtained with the same camera placement as planned for NTF are presented and plans for facility testing with a specially designed test wing are discussed. Author

N84-11458*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A TECHNIQUE FOR DYNAMICALLY CALIBRATING PRESSURE TRANSDUCERS AT CRYOGENIC TEMPERATURES

Barry V. Gibbens Oct. 1983 18 p refs

(NASA-TM-85695; NAS 1.15:85695) Avail: NTIS HC A02/MF A01 CSCL 14B

A technique was developed for the calibration of dynamic pressure transducers at cryogenic temperatures. The calibration system utilizes an 8.9 Newton peak thrust shaker which oscillates a helium-filled bellows to generate a sinusoidal dynamic pressure to calibrate transducers immersed in a cryogenic environment. The system has a dynamic pressure measurement uncertainty of approximately 11% and is capable of producing peak-to-peak dynamic pressure amplitudes of 1.4 kPa over a frequency range of 40 to 100 hertz and a temperature range of 100 to 300 K. It provides an unprecedented capability of both static and dynamic calibration of pressure transducers from ambient to cryogenic temperature. M.G.

N84-11459*# Gulton Industries, Inc., Albuquerque, N.Mex. Data Systems Div.

NIMBUS-ERB INSTRUMENT STUDY Interim Report

J. L. Swedberg and R. H. Maschhogg 23 Jan. 1982 36 p

(Contract NAS1-16468)

(NASA-CR-165922; NAS 1.26:165922) Avail: NTIS HC A03/MF A01 CSCL 14B

Characterization studies were performed on flight spare ERB wide field of view Earth flux sensors. Field of view sensitivity profiles were determined for total energy sensors with and without painted baffles. Similarly, sensors with filter domes were also characterized in terms of field of view. The transient response of sensors with filter domes was determined for both long wave and short wave radiation. Long wave radiation interacts directly with

the quartz dome causing undesired responses. While short wave radiation was shown not to interact with the domes, modules as a whole exhibited a secondary response to bursts of short wave radiation indicative of a heating mechanism. How the results of this characterization can or should be applied to the data emanating from these sensors on ERB-6 and 7 is outlined. Author

N84-11460*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROPOSED FAST-RESPONSE OXYGEN MONITORING AND CONTROL SYSTEM FOR THE LANGLEY 8-FOOT HIGH-TEMPERATURE TUNNEL
Jag J. Singh, William T. Davis, and Richard L. Puster Nov. 1983 30 p refs
(NASA-TP-2218; L-15666; NAS 1.60:2218) Avail: NTIS HC A03/MF A01 CSCL 14B

A fast-response oxygen monitoring and control system, based on a Y2O3-stabilized ZrO2 sensor, was developed and tested in the laboratory. The system is capable of maintaining oxygen concentration in the CH4-O2-air combustion product gases at 20.9 + or - 1.0 percent. If the oxygen concentration in the exhaust stream differs from that in normal air by 25 percent or more, an alarm signal is provided for automatic tunnel shutdown. The overall prototype system response time was reduced from about 1 sec in the original configuration to about 0.2 sec. The basis of operation and the results of laboratory tests of the system are described. S.L.

N84-11461# Northrop Corp., Norwood, Mass. Precision Products Div.
MICRO-OPTIC GYRO TECHNOLOGY Final Report
J. M. Connors, A. W. Lawrence, and J. R. Haavisto Jan. 1983 60 p refs
(Contract DAAH01-81-C-B138)
(AD-A130990; PPD-E-83-10589) Avail: NTIS HC A04/MF A01 CSCL 17/7

The final version of Northrop's micro-optic gyro (MOG) will consist of thin-film devices integrated on a common substrate. We have previously demonstrated that it is possible to construct a resonant cavity from thin-film waveguides. The current effort is to integrate thin-film frequency shifters with these waveguide resonators. This section describes the operation of the MOG and presents a brief history of the program. GRA

N84-11462# Stanford Univ., Calif. Dept. of Electrical Engineering.
THE MAGNETIC FIELD GRADIOMETER Final Technical Report
A. C. Fraser-Smith Feb. 1983 97 p
(Contracts N00228-81-C-AB56; N00014-75-C-1095; N00014-77-C-0292)
(AD-A131477; TR-E723-1) Avail: NTIS HC A05/MF A01 CSCL 20/3

This report has two principal goals. First, to present a general review of magnetic field gradiometers and, second, to provide new data concerning these gradiometers, including new information about their response to magnetic dipole fields. A system of nomenclature is introduced that is consistent with the mathematical concept of gradient and which provides a basis for discussions of the different functions of magnetic field gradiometers and differential magnetometers. The distinction between component gradiometers and total field gradiometers is also stressed. GRA

N84-11463# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Vehicle Equipment Div.
COMBINED ENVIRONMENT TEST OF SANGAMO WESTON SABRE 12 AIRBORNE RECORDER Final Report, 25 Feb. 1982 - 11 Mar. 1982
Preston S. Hall and Gerald A. Plzak Jun. 1983 43 p refs
(AF Proj. 2401)
(AD-A131278; AFWAL-TR-83-3052) Avail: NTIS HC A03/MF A01 CSCL 01/4

A combined environment test was performed on the Sangamo Weston SABRE XII airborne recorder for reliability evaluation. The recorder was exposed to various flight conditions characteristic of the F-111 flight profiles. It was found that the recorder performed within equipment specifications when exposed to the combined environments. Author (GRA)

N84-11464# Litton Systems, Inc., Woodland Hills, Calif. Guidance and Control Systems Div.
NUCLEAR MOMENT ALIGNMENT, RELAXATION AND DETECTION MECHANISMS Final Technical Report, Mar. 1982 - Feb. 1983
Ann T. Nicol, Leo Lam, and W. Boley Mar. 1983 95 p
(Contract F49620-82-C-0047; AF Proj. 2301)
(AD-A131546; AFOSR-83-0622TR; Rept-404720) Avail: NTIS HC A05/MF A01 CSCL 14/2

The reported physics research is part of an overall program to develop a nuclear magnetic resonance gyro that makes use of an optically pumped alkali metal vapor both to align the magnetic moments of the noble gas nuclei and to detect the weak magnetic fields that are generated by these precessing nuclear moments. A model for the distribution of polorization of optically pumped rubidium across a sample cell is developed. Results of the computer modeling are presented graphically for various cells as a function of cell size, incident light intensity, wall type and gas fill. A study of the effect of direct nuclear dipole-dipole interaction on surface relaxation of 129Xe is reported. Results indicate that the mechanism for 129Xe nuclear relaxation on surfaces studied is not the direct dipolar interaction and must be attributed to an electron-nucleus interaction. Studies of 129Xe relaxation on several surface types show an order of magnitude more efficient than silicone treated surfaces for relaxing xenon nuclear spins. GRA

N84-11465# Sandia Labs., Albuquerque, N. Mex.
OPTICAL SURVEILLANCE FOR INTERNATIONAL SAFEGUARDS: PRESENT AND FUTURE
C. S. Johnson, C. S. Sonnier, and I. G. Waddoups 1983 4 p refs Presented at the 24th Ann. Meeting of the Inst. of Nucl. Mater. Management, Vail, Colo., 10 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-014278; SAND-83-1485C; CONF-830709-8) Avail: NTIS HC A02/MF A01

Optical surveillance, one of the principal containment and surveillance measures is accomplished using film camera and video systems. Improved film camera and video systems developed in several countries in the final stages of evaluation and are expected to be placed into routine safeguards use in the near future. One system is the Surveillance and Television Recording (STAR) System. This system is a dual camera high capability unit which is expected to replace the current systems as time progresses. Another is the MINISTATE which is a much smaller, single camera unit which incorporates recent technology advances, and retains many of the basic STAR features at a considerably lower cost. Beyond these near-term advances, it is expected that video camera and recording technology will soon be available which will make video systems competitive with the film camera systems. The introduction of such technology will provide for other advanced techniques, such as laser disc recording and image processing, which are expected to improve the effectiveness of optical surveillance systems. DOE

N84-11466# Los Alamos Scientific Lab., N. Mex.
OPTICAL EMISSION OF EXPLODING-FILM AND WIRE-INITIATED DISCHARGES
K. D. Ware and C. R. Jones 1983 9 p refs Presented at Soc. of Photo-Opt. Instrumentation Engr. Conf., Santa Fe, N. Mex., 11 Apr. 1983
(Contract W-7405-eng-36)
(DE83-014154; LA-UR-83-1588; CONF-830425-29) Avail: NTIS HC A02/MF A01

Optical sources of several megawatts sq cm over large surface areas are available from electrical discharges initiated by exploding films and wires immersed in a gas. Discharging high current capacitor banks into the metal onductors causes them to melt,

vaporize, and then eventually ionize to a high conductivity plasma of less than a million/cm length resistance. As such, over 1000 MW of ohmic heating goes into the discharge, elevating its blackbody temperature up to 35,000 K. Film thicknesses from 0.1 to 10 (SIGMA)m and wire diameters from 0.051 to 0.25 mm with lengths ranging from 8 to 90 cm were exploded and the brightness temperatures measured in the spectral regions about 200, 280, and 520 nm. The optical emission generally increased with the time rate of change of the current, the current per unit diameter for the films, and the gas pressure in the cell, but showed little dependence on the mass or kind of metal exploded. The discharge radius expanded at velocities of approximately 1.5 km/s. DOE

N84-11467# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
RECENT ADVANCES IN HIGH-SPEED PHOTON DETECTORS
Branko Leskovar 9 Dec. 1982 10 p refs Presented at the 6th Intern. Congr. and Trade Fair, Munich, 27 Jun. - 1 Jul. 1983
(Contract DE-AC03-76SF-00098)
(DE83-014862; LBL-15381; CONF-830673-1) Avail: NTIS HC A02/MF A01

Recent progress of some fast high-gain photon detectors using photoemission and secondary emission processes is reviewed and summarized. Specifically, performance characteristics are presented, of the new Amperex XP 2020, RCA 8854, and Hamamatsu R 647-01 conventionally design photomultipliers. Also, characteristics are presented of the ITT F 4129 and Hamamatsu R 1564U extended lifetime microchannel plate photomultipliers as well as certain special made photomultipliers intended for application in positron emission tomography, high energy physics and plasma diagnostic experimental systems. Finally, microchannel plates as photon detectors for ultraviolet and X-ray wavelengths are discussed. DOE

N84-11468# Los Alamos Scientific Lab., N. Mex.
SMARTER RADIATION MONITORS FOR SAFEGUARDS AND SECURITY
P. E. Fehlau, J. C. Pratt, J. T. Markin, and T. Scurry, Jr. (TSA Systems, Inc., Boulder, Colo.) 1983 8 p refs Presented at 24th Ann. Meeting of the Inst. of Nucl. Mater. Management, Vail, Colo., 10 Jul. 1983
(Contract W-7405-eng-36)
(DE83-015259; LA-UR-83-2036; CONF-830709-28) Avail: NTIS HC A02/MF A01

Versatile microprocessor systems permit more efficient, and more useful methods for monitoring nuclear materials. One such method is simple stepwise monitoring, which has variable alarm levels to expedite monitoring where extended monitoring periods are required. Another method, sequential probability ratio logic, tests data as it accumulates against two hypothesis - background, or background plus a transient diversion signal - and terminates monitoring as soon as a decision can be made that meets false alarm and detection confidence requiresments. A third method, quntitative monitoring for personnel, calculates count ratios of high to low energy gamma ray regions to predict whether the material detected is a small quantity of bare material or a larger quantity of shielded material. Microprocessor system subprograms can assist in detector calibration and trouble shooting. Examples of subprograms are a variance analysis technique to set hias levels in plastic scintillators and a state of health routine for detecting malfunctions in digital circuit components. DOE

N84-11469# Los Alamos Scientific Lab., N. Mex. Electronics Div.
PHOTOCONDUCTIVE POWER SWITCHES
W. C. Nunnally and R. B. Hammond 1983 8 p refs Presented at the 27th Ann. Intern. Tech. Symp. on High Speed Phot., Videography and Photonics, San Diego, Calif., 21 Aug. 1983
(Contract W-7405-eng-36)
(DE83-015239; LA-UR-1732; CONF-830874-9) Avail: NTIS HC A02/MF A01

The advantages and the potential of photoconductive switches applied to high power systems are outlined. The photoconductive effect can be used to switch large amounts of energy by changing the conductivity of a solid state circuit element many orders of magnitude with a high power laser. The simplicity of these devices offers many advantages in high power applications when combined with high power pulsed lasers. The surge capability, the switched energy gain, and the maximum average power for photoconductive power switches are discussed and the results of a 100-kV, 100-MW photoconductive switch experiment transferring 20 J in 200 ns are presented. DOE

N84-11470# Sandia Labs., Albuquerque, N. Mex.
CARBON PIEZORESISTIVE STRESS GAUGE
W. David Williams, David J. Fogelson (Ktech Corp.), and Larry M. Lee (Ktech Corp.) 1983 5 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-016505; SAND-83-06540; CONF-830719-40) Avail: NTIS HC A02/MF A01

The response of the carbon piezoresistive stress gauge was measured in simple and complex shock induced stress fields. The carbon gauge is encapsulated in either a castable epoxy or alumina-filled epoxy and shocked. The gauge response is measured under both gas gun generated, planar shock wave loading and explosive driver generated, divergent shock wave loading. The experimental records are compared to two dimensional, axisymmetric computer calculations of the mean stress and component stresses. There is good agreement between the gauge response and the stress component normal to the plane of the gauge. DOE

N84-11471# Oak Ridge National Lab., Tenn.
RESPONSE OF INSTALLED TEMPERATURE SENSORS
T. W. Kerlin (Tennessee Univ.), R. L. Shepard, H. M. Hashemian (Analysis and Measurement Services, Inc.), and K. M. Petersen (Analysis and Measurement Services, Inc.) 1982 11 p refs Presented at the 6th Symp. on Temp., Washington, 14 Mar. 1982
(Contract W-7405-eng-26)
(DE83-015509; CONF-820306-12) Avail: NTIS HC A02/MF A01

Two new methods were developed to permit evaluation of the time response of installed temperature sensors. One permits improved a priori estimation of the response that will be obtained upon installation and the other permits in situ evaluation of the response of the sensor after installation. The a priori method requires response measurements at two or more fluid flow conditions to evaluate an internal (or intrinsic) component of the time constant that is independent of fluid conditions and a surface component that depends on fluid conditions. Estimation of the sensor response in other fluids is obtained from the heat transfer correlations for other fluids. The in situ method provides the time response of installed thermocouples and resistance thermometers by passing an electric current through it and measuring the transient response of the sensor following cessation or initiation of the Joule heating. This response can be nalyzed to predict the sensor's response to a fluid temperature change. This measurement permits the response time qualification of newly installed sensors and subsequent monitoring of changes in response time with service. DOE

N84-11472# California Univ., Livermore. Lawrence Livermore Lab.
FABRY-PEROT VELOCIMETRY TECHNIQUES: IS DOPPLER SHIFT AFFECTED BY SURFACE-NORMAL DIRECTION?
David R. Goosman, Alan M. Frank, Henery H. Chau, and Norval L. Parker 29 Jun. 1983 11 p refs Presented at the SPIE Ann. Intern. Tech. Symp. on High Speed Phot., Videography and Photonics, San Diego, Calif., 21 Aug. 1983
(Contract W-7405-eng-48)
(DE83-015902; UCRL-89422; CONF-830874-11) Avail: NTIS HC A02/MF A01

The Fabry-Perot laser velocimeter is used for hydrodynamic, equation of state, surface ejecta mass measurements and for other applications. Velocities of shocked surfaces can be measured to better than 1%, and multiple records can be superimposed on a

single piece of film. Many phenomena are being investigated for possible sources of error. One concern was whether the direction of the surface normal could affect the measured Doppler shift, or whether the direction of the particle velocity was sufficient to determine the shift. A series of experiments with angles between the laser and particle velocity as small as 200 have shown that for the surface smoothnesses encountered no effect is seen which is caused by varying the direction of the surface normal. DOE

N84-11473# California Univ., Livermore. Lawrence Livermore Lab.
X-RAY STREAK CRYSTAL SPECTROGRAPHY
R. L. Kauffman, T. Brown, and H. Medecki 1 Jul. 1983 5 p refs Presented at the 27th Ann. Intern. Tech. Symp. on High Speed Phot., Videography and Photonics, San Diego, Calif., 21-24 Aug. 1983
(Contract W-7405-eng-48)
(DE83-015618; UCRL-89537; CONF-830874-12) Avail: NTIS HC A02/MF A01

An X-ray streaked crystal spectrograph for making time resolved X-ray spectral measurements was built which can access Bragg angles from 110 to 380 and X-ray spectra from 200 eV to greater than 10 keV. Resolving powers, E/ delta E > 200 at 1 keV and time resolution less than 20 psec. The instrument is described and an example of the data obtained is given. DOE

N84-11474# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abteilung Mechanik.
ELECTRONIC MEASURING INSTRUMENTS FOR MIXTURES OF FLUIDS [ELEKTRONISCHE EINRICHTUNGEN ALS TEILE VON MESSGERAETEN ZUR MENGENMESSUNG VON FLUIDEN]
Detlev Mencke Dec. 1982 17 p refs In GERMAN
(PTB-Me-40; ISSN-0341-6720) Avail: NTIS HC A02/MF A01

A list of electronic measuring instruments for fluid mixture measurements is presented. For each instrument one or two application examples are given. The most important measurement principles are also tabulated. Author (ESA)

N84-11475# Fraunhofer-Inst. fuer Informations- und Datenverarbeitung, Karlsruhe (West Germany).
FUNDAMENTALS AND PHYSICAL LIMITS OF HOLOGRAPHIC MEMORIES WITH AND WITHOUT ASSOCIATIVE RECALL Final Report, Dec. 1980
Peter-Joachim Becker, Hermann Bolle, Roland Munser, and Ulrike Wagner Bonn Bundesministerium fuer Forschung und Technologie May 1983 320 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-83-002; ISSN-0170-9011) Avail: NTIS HC A14/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 48,50

Associative memories with high capacity were developed. With state-of-the-art components associative recall times of 20 to 100 microsec in 1 to 100 million bits are achieved. Since storage materials have either long writing times (e.g. LiNbO3) or short storage times (e.g. Bi12SiO20) only EPROMs or dynamic memories can be constructed, so in the actual state of this technology, the manufacture of holographic memories with associative recall is not possible. Author (ESA)

N84-11476# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.
MICROELECTRONIC BENDING AND PRESSURE SENSORS Final Report, Oct. 1981
Josef Binder, Guenter Ehrler, and Klaus Wetzel Bonn Bundesministerium fuer Forschung und Technologie May 1983 96 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-100; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,20

Development of silicon pressure sensors for measurement of low (< 100 mbar) and middle and high pressure (> 60 bar) is reported. The low pressure sensors were built as silicon bending sensors and supplied with a positive temperature coefficient resistance for temperature compensation. Special attention was paid to humidity stability. For higher pressure silicon-diaphragm pressure sensors were developed with a design based on the (111)-surface. The surface design and the two-step backside etch-technology were optimized and stabilized. Pressure sensor elements were constructed and inserted in cases. Environmental tests were carried out and all sensors show satisfactory behavior. Author (ESA)

N84-11531# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
INVESTIGATION OF THE PRECISION AND UTILIZATION OF A DIGITAL BAROMETER BASED ON THE PIEZORESISTIVE PRINCIPLE [UNTERSUCHUNG ZUR GENAUIGKEIT UND DEN EINSATZMOEGLICHKEITEN EINES DIGITALBAROMETERS NACH DEM PIEZORESISTIVEN PRINZIP]
H. Ingensand *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 19-32 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11537# Technische Hochschule, Aachen (West Germany). Inst. fuer Geodaesie.
INVESTIGATION OF THE DISTANCEMETER GEODIMETER 122 AND THE AUTORANGER-A [UNTERSUCHUNG DER DISTANZMESSER GEODIMETER 122 UND AUTORANGER-A]
Bertold Witte *In* Bonn Univ. Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 131-148 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11719# Joint Publications Research Service, Arlington, Va.
DEVICE FOR GRADED EXERCISING OF RATS IN PRESSURE CHAMBER
K. S. Yurova and V. M. Potabenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 142-146 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 91-94 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

36 LASERS AND MASERS

Includes parametric amplifiers.

N84-11477# California Univ., Livermore. Lawrence Livermore Lab.
RAISING THE SURFACE DAMAGE THRESHOLD OF NEUTRAL SOLUTION PROCESSED BK-7 BY PULSE LASER IRRADIATION
J. E. Swain, W. H. Lowdermilk, and D. Milan 1982 5 p refs Presented at Conf. on Laser Induced Damage in Opt. Mater., Boulder, Colo., 15 Nov. 1982
(Contract W-7405-eng-48)
(DE83-012660; UCRL-88156; CONF-821170-3) Avail: NTIS HC A02/MF A01

Gradient-index antireflecting surfaces can be produced by neutral solution processing of bare polished surfaces on borosilicate glasses. These processed surfaces have a median surface damage thereshold of 12 J sq cm for 1-ns, 1064-nm pulses. The surface damage thresholds can be increased to fluences as large as 25 J sq cm by irradiating the surface with 1064-nm wavelength pulses at fluences below the initial threshold of 12 J sq cm. For surfaces in their initial state, or surfaces subjected to repetitive laser irradiation, surface damage thresholds increased as the square root of pulse duration over the range of pulse durations from 1 to 20 ns. DOE

N84-11478# Arizona State Univ., Tempe. Dept. of Physics.
ON THE CO2 LASER GENERATED CHANNEL CONDUCTIVITY AND ELECTRON BEAM IONIZATION OF AMMONIA
A. W. Ali 15 Aug. 1983 25 p refs
(Contract N60921-83-WR-W0088; DARPA Order 4395)
(AD-A131591; NRL-MR-5150) Avail: NTIS HC A02/MF A01 CSCL 20/5

An equilibrium electron density in ammonia channel generated by CO2 laser absorption is calculated and the corresponding residual conductivity is given. Electron beam collisional and avalanche ionization parameters in ammonia are presented. Calculations are made for electron beam generated ionization and conductivity in ammonia. These are performed for two experiments. The beam generated conductivity seems to predominate the residual conductivity generated by the laser absorbed channels. Author (GRA)

N84-11479# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
LASER CHEMICAL ETCHING OF VIAS IN GaAs
Armin W. Tucker and Milton Birnbaum 15 Jun. 1983 18 p refs
(Contract F04701-82-C-0083)
(AD-A131288; SD-TR-83-38; TR-0083(3925-01)-2) Avail: NTIS HC A02/MF A01 CSCL 20/5

Rapid drilling of vias in thick wafers (381 micons) of GaAs has been achieved by a laser assisted etching process. The technique utilized a CW visible argon ion laser and an etchant gas of low pressure C12. Data on the dependence of the etch rate on the laser power, wavelength and C12 gas pressure are presented. GRA

N84-11480# North Texas State Univ., Denton. Center for Applied Quantum Electronics.
PHASE CONJUGATION IN A RING LASER CAVITY Final Report, 1 Sep. 1979 - 31 Aug. 1982
Jean-Claude M. Diels 30 Jun. 1983 72 p refs
(Contracts N00014-81-C-0816; N00014-79-C-0947)
(AD-A131156) Avail: NTIS HC A04/MF A01 CSCL 20/5

We investigate the dynamics of phase conjugation by degenerate four wave mixing (DFWM) inside a laser cavity. This problem is shown to be important in connection with (a) protection of a high power laser against self focusing and (b) development of a new type of laser gyro. Our theory demonstrates that fast optical and temporal phase conjugation by DFWM is incompatible with large (approx. or equal to 1) reflection coefficients. Therefore, it appears to be better to implement DFWM for the coupling of the two counterpropagating pulses in a ring laser, rather than as an end cavity reflection of a linear laser. Various schemes and media were investigated (sodium vapor, amplifier-absorber, jet, saturable absorber thin jet, saturable absorber coupled by evanescent wave). The largest nonlinear third order susceptibility was found in the amplifier jet. Study of fast dynamics of DFWM in an absorber led us to develop a ring laser producing pulses shorter than 55 fs, tunable in a 20 nm range. The measurements of DFWM inside the absorber jet of a ring laser are the basis of a new diagnostic method to measure very short (less than or approximately 100 fs) relaxation rates. Author (GRA)

N84-11481# Vanderbilt Univ., Nashville, Tenn. Dept. of Chemistry.
SPECTROSCOPIC STUDIES OF LASING TRANSITIONS IN THE DIATOMIC MERCURY HALIDES Annual Summary Report, 1 May 1982 - 30 Apr. 1983
Joel Tellinghuisen Aug. 1983 41 p refs
(Contract N00014-81-K-0477)
(AD-A131466; N00014-81-K-0477-2) Avail: NTIS HC A03/MF A01 CSCL 20/5

The B X, C X, and D X emission transitions of HgCl, HgBr, and HgI have been photographed and analysed for single isotopomers containing 200 Hg. New methods have been devised for fitting data and approximating potential curves for heavy diatomics like the HgX molecules. Results for these molecules offer significant improvements in the spectroscopic parameters and related properties, such as Franck-Condon factors and dissociation energies. Author (GRA)

N84-11482# California Univ., Berkeley. Dept. of Chemistry.
ENERGY PARTITIONING TO PRODUCT TRANSLATION IN THE INFRARED MULTIPHOTON DISSOCIATION OF DIETHYL ETHER
L. J. Butler, R. J. Buss, R. J. Brudzynski, and Y. T. Lee 7 Jun. 1983 39 p refs
(Contract N00014-75-C-0671)
(AD-A131555) Avail: NTIS HC A03/MF A01 CSCL 20/5

The infrared multiphoton decomposition of diethyl ether (DEE) has been investigated by the crossed laser-molecular beam technique. The center-of-mass product translational energy distributions (P (E primed)) were measured for the two dissociation channels: (1) DEE > C2H5O + C2H5 and (2) DEE > C2H5OH + C2H4. The shape of the P(E') measured for the radical channel (1) is in agreement with prediction of statistical unimolecular rate theory. The translational energy released in the concerted reaction (2) peaks at 24 kcal/mole; this exceedingly high translational energy release with a relatively narrow distribution results from the recoil of the products from each other down the exit barrier. Applying statistical unimolecular rate theory, the average energy levels from which DEE dissociated to products are estimated using the measured P(E') for the radical channel (1). Author (GRA)

N84-11483# Sandia Labs., Albuquerque, N. Mex.
DESIGN, PERFORMANCE AND OPERATION OF THE LASER INTERFEROMETRIC DILATOMETER
W. D. Drotning May 1983 109 p refs
(Contract DE-AC04-76DP-00789)
(DE83-014359; SAND-83-0197) Avail: NTIS HC A06/MF A01

A dilatometer was designed and constructed to perform high precision thermal expansion measurements over the temperature range from ambient to 900 K. The design, construction, operation, and performance of the device is detailed. The measurement of length change employs an optical interferometer system which consists of a Michelson interferometer, a two frequency HeNe laser, and ac fringe detection. Length change precision of better than + or - 0.05 (SIGMA)m is achieved. Dilatometer control, status, data acquisition, and analysis functions are achieved by a minicomputer in order to achieve automated control. Further design features are incorporated which minimize sample preparation and assembly time to achieve rapid sample measurements. The interferometer alignment is under computer control to assist the operator during final adjustment and to maintain alignment throughout the course of a measurement. The performance of the device was evaluated by measurement of three thermal expansion standards (fused silica, platinum, and copper). DOE

N84-11484# Los Alamos Scientific Lab., N. Mex. Chemistry Div.
OPTICALLY PUMPED ULTRAVIOLET AND INFRARED LASERS DRIVEN BY EXPLODING METAL FILMS AND WIRES
C. R. Jones and K. D. Ware 1983 8 p refs Presented at the Soc. of Photo-Optical Instrumentation Engr. Conf., Santa Fe, N. Mex., 11-15 Apr. 1983
(Contract W-7405-eng-36)
(DE83-014169; LA-UR-83-1587; CONF-830425-30) Avail: NTIS HC A02/MF A01

The 342-nm molecular iodine and 1315-nm atomic iodine lasers were optically pumped by intense light from exploding metal film and exploding wire discharges. Brightness temperatures for the exploding film discharges were approx. 25,000 K and for the wire discharges were approx. 30,000 K. For the I2 laser the 3.5 cm diameter by 40 cm long pumped volume lies adjacent to the wire or film of the same length. Pressures of 1 to 6 torr I2 and 1 to 3 atm SF, CF4, or Ar were used in the stainless steel cell. Using 20 (SIGMA)F capacitance charged to 40 kV, a 0.25-mm tungsten wire, 3 torr I2, and a 2 atm SF6, an energy of 2 J was obtained from the laser in a pulse of 8 (SIGMA)s duration. The specific output energy was 7 J/l. Substitution of a cylindrical Al film for the wire, under otherwise similar conditions, led to a X10 output

energies and efficiencies were obtained with similar input energy. An output pulse of 12 J and 12 (SIGMA)s duration was measured for a specific output energy of 18 J/l. A laser energy of 110 J in a 20-us-long pulse was measured from atomic iodine using a wire discharge along the axis of a larger call. DOE

N84-11485# California Univ., Livermore. Lawrence Livermore Lab.
LASER DYE TOXICITY, HAZARDS AND RECOMMENDED CONTROLS
J. A. Mosovsky 1983 18 p refs Presented at the Am. Ind. Hygiene Conf., Philadelphia, 22-27 May 1983
(Contract W-7405-eng-48)
(DE83-011896; UCRL-89148; CONF-830584-1) Avail: NTIS HC A02/MF A01

Laser dyes are complex fluorescent organic compounds which, when in solution with organic solvents, form a lasing medium. The wavelength of a dye laser's output beam can vary with different dyes, concentrations, and solvents, giving it a tunable feature capable of emitting ultraviolet, visible, or infrared radiation. Toxicity information on the approximately 100 commercially available laser dyes is very scarce. Limited animal experimentation has been performed with only a few dyes. This paper summarizes what is known about laser dye toxicity, and offers recommendations for controlling dye hazards. The laser dyes investigated were categorized according to their central chemical structures. Prepared laser dye solutions usually contain very small quantities of dye--typical dye concentrations are 10(+2) to 10(+5) molar. For this reason, the solvent in which the dye is dissolved plays an important role when defining potential hazards. Practically all the solvents used are flammable and toxic by inhalation and skin absorption, and therefore must be controlled properly. DOE

N84-11486# Stanford Univ., Calif. Labs. of Physics.
LASER TECHNIQUES FOR EXTREME-ULTRAVIOLET SPECTROSCOPY
S. E. Harris, J. F. Young, R. G. Caro, R. W. Falcone, D. E. Holmgren, D. J. Walker, J. C. Wang, J. E. Rothenberg, and J. R. Willison Jun. 1983 7 p refs Presented at 6th Intern. Conf. on Laser Spectry., SICOLS 1983, Interlaken, Switzerland, 27 Jun. - 1 Jul. 1983
(Contracts N00014-78-C-0403; F49620-83-C-0016; DE-AC08-83DP-40178)
(DE83-014834; GL-3588; CONF-830666-3) Avail: NTIS HC A02/MF A01

Several techniques for using lasers to study core excited energy levels in the spectral region between 10 eV and 100 eV are described. Levels that are metastable against autoionization and, in some cases, against both autoionization and radiation are investigated. DOE

N84-11487# Los Alamos Scientific Lab., N. Mex.
HIGH-EFFICIENCY FREE-ELECTRON-LASER EXPERIMENTS
K. Boyer, C. A. Brau, J. C. Goldstein, K. L. Hohla, B. E. Newnam, W. E. Stein, R. W. Warren, and J. G. Winston Aug. 1983 4 p refs Presented at Photo-Opt. Instrumentation Engr. Conf., Santa Fe, N. Mex., 11 Apr. 1983
(Contract W-7405-eng-36)
(DE83-015218; LA-UR-83-2228; CONF-830425-34) Avail: NTIS HC A02/MF A01

Experiments with a tapered-wiggler free-electron laser demonstrated extraction of about 3% of the energy from the electron beam and measured the corresponding optical emission. These results are in excellent agreement with theory and represent an order-of-magnitude improvement over all previous results. DOE

N84-11488# Mathematical Sciences Northwest, Inc., Bellevue, Wash.
ADVANCED-LASER DEVELOPMENT FOR ISOTOPE SEPARATION Final Report
Jun. 1983 115 p refs
(Contract DE-AC06-80ET-33067)
(DE83-016151; DOE/ET-33067-T1) Avail: NTIS HC A06/MF A01

To address a number of the issues associated with lasers appropriate for both atomic vapor and molecular laser enrichment schemes, pertinent technologies on two test devices were developed. These were a high pulse rate, 100 watt excimer laser named Mistral, and a 20 watt copper-vapor laser (CVL). Mistral is a closed-loop, 100 W, kilohertz rare gas halide laser system. The first half of the Mistral effort dealt with the study of gas flow and acoustic effects in high PRF rare gas halide lasers. In burst mode operation, 1250 Hz operation was demonstrated, the effects on flow quality of acoustic dampers were measured, and gas clearing factors of 2.5 at 1 kHz were demonstrated. The second half of the Mistral program dealt with extending the run time capability of the laser. This effort culminated with the continuous operation of Mistral for almost eight hours at 500 ppS, producing over 50 mJ/pulse at 308 nm on a single fill of XecI gas mixture. The effectiveness of using magnetic pulse compression in the modulator circuit of a copper-vapor laser (CVL) was also verified. The magnetic switching/pulse compression scheme as used on both the CVL and Mistral greatly extends thyratron lifetime. DOE

N84-11489# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.
LASER ACCELERATORS
A. M. Sessler Apr. 1983 7 p refs Presented at Particle Accelerator Conf., Santa Fe, N. Mex. 21-23 Mar. 1983
(Contract DE-AC03-76SF-00098)
(DE83-016123; LBL-15237; CONF-830311-185) Avail: NTIS HC A02/MF A01

Laser accelerators are characterized, by their mode of operation, into media, far field, and near field accelerators. The first category, media accelerators, include the inverse Cherenkov effect accelerator, the plasma focus accelerator, and the beat wave accelerator (BWA). The second category, far field accelerators, include the two wave device and the inverse free electron accelerator (IFEI). The third category, near field accelerators, includes conventional linac scaled to small dimensions, dielectric sheets, small holes in dielectric cylinders, and gratings. An example from each category is given; namely: (1) the BWA; (2) the IFEL; and (3) the linac scaled to small dimensions and powered by a free electron laser (FEL). Grating accelerators are also discussed. DOE

N84-11490# Los Alamos Scientific Lab., N. Mex.
A NOVEL 15.9-MICRON SOURCE
M. I. Buchwald, C. R. Jones, and L. Y. Nelson (Korry Electronics, Inc., Seattle, Wash.) 1983 5 p refs Presented at the Soc. of Photo-Opt. Instrumentation Engr. Conf., Santa Fe, N. Mex., 11 Apr. 1983
(Contract W-7405-eng-36)
(DE83-015234; LA-UR-83-2037; CONF-830425-33) Avail: NTIS HC A02/MF A01

Laser emission was generated in (15)ND3 by pumping at 860.4 cm. Strong laser action was observed at 123 cm, 109 cm and, with up to 10 millijoules extracted, at 628.1 cm. Spectroscopic analysis indicates that the pumping arises from, and the 628.1 cm emission terminates on, the same rotational state. Analysis of the time histories of the three laser emissions as well as studies of laser output energies indicates that 15.9 micron output arises from a 4 wave type process. This system, in addition, clarifies the interpretation of studies of CO2 laser pumped ammonia lasers. DOE

N84-11491# California Univ., Livermore. Lawrence Livermore Lab. Electromagnetic Sciences Group.
ELECTROMAGNETIC FORCES RELATED TO FLASH-LAMP FAILURES IN THE NOVA/NOVETTE AMPLIFIERS
Brian Grant Jul. 1983 39 p refs
(Contract W-7405-eng-48)
(DE83-016524; UCID-19856) Avail: NTIS HC A03/MF A01

A high rate of breakage in flashlamps destined for the Nova and Novette laser system amplifiers has prompted an investigation into the cause. Discussed herein is the possibility that electromag-

netic forces (resulting from large currents in these lamps) are bending the anodes and cathodes and, thus, cracking the glass seals. Specifically, the forces resulting from these currents are approximated without indicating whether or not these forces are sufficient to break the seals. The results demonstrate that forces up to .9 N/cm (.514 lbs/in.) directed away from the reflector panel can be distributed along the anodes and cathodes. Also, the scalloped nature of the panel provides good isolation between lamps; the lamp to lamp forces are negligible. Time domain plots of the forces are included as well as the computer program which was developed. DOE

N84-11492# California Univ., Berkeley. Lawrence Berkeley Lab.
MOLECULAR-BEAM STUDIES OF PHOTODISSOCIATION REACTIONS Thesis
Douglas John Krajnovich May 1983 367 p refs
(Contracts DE-AC03-76SF-00098; N00014-76-C-0671)
(DE83-015962; LBL-15354) Avail: NTIS HC A16/MF A01

A variety of photodissociation reactions were investigated by crossed laser and molecular beams methods. The vibrational predissociation reactions of (C2H4)2 and (NH3)2 at 10.6 (SIGMA) are discussed. Results of infrared multiphoton dissociation studies of C2F5Cl and C2F5Br are qualitatively consistent with RRKM theory and the rate equation model for infrared multiphoton absorption and dissociation. Studies of bromine dimer photodissociation at 484 nm and 532 nm are reported. A reliable lower bound of 5.2 kcal/mole is obtained for the binding energy of Br3. The study of CF2Br2 photodissociation indicates that: Br atom elimination is the only important primary dissociation channel at 248 nm; the electronic transition leading to formation of CF2Br + Br is polarized parallel to the Br-Br axis in CF2Br2; some of the CF2Br primary products undergo efficient secondary photodissociation. Results of a study of the ultraviolet photodissociation of C2F5Br, C2F5I, and 1,2-C2F4BrI are presented. Center of mass recoil energy and angular distributions are determined for each of these reactions. DOE

N84-11493# Brookhaven National Lab., Upton, N. Y. Office of National Synchrotron Light Source.
INVERSE FREE-ELECTRON LASER ACCELERATOR
C. Pellegrini and R. Campisi 1982 53 p refs Presented at the SLAC Summer Inst. on Particle Phys., Stanford, Calif., 17 Jul. 1982
(Contract DE-AC02-76CH-00016)
(DE83-016370; BNL-33476; CONF-820709-4) Avail: NTIS HC A04/MF A01

The basic physical properties of an inverse free-electron laser are described, and an estimate of the order of magnitude of the accelerating field obtainable with such a system is made. The general ideas are applied to the design of an actual device and through this example a more accurate evaluation of the fundamental as well as the technical limitations that this acceleration scheme imposes is given. DOE

N84-11494# Sandia Labs., Albuquerque, N. Mex.
PARTICLE-VELOCITY MEASUREMENTS OF LASER-INDUCED SHOCK WAVES USING ORVIS
Stephen A. Sheffield and George A. Fisk 1983 7 p refs Presented at the 27th Ann. Intern. Tech. Symp. on High Speed Photography Videography and Photonics, San Diego, Calif., 21 Aug. 1983
(Contract DE-AC04-76DP-00789)
(DE83-016503; SAND-83-1474C; CONF-830874-15) Avail: NTIS HC A02/MF A01

Experiments in which 2 to 200-(SIGMA)m-thick aluminum foils were irradiated with Nd/YAG laser pulses at 3 to 4 GW/cm(2) for 10 ns are discussed. An optically recording velocity interferometer system (ORVIS) was used to record the resulting particle velocity histories with nanosecond resolution. It is shown that foils suspended in air are accelerated, over a period about three times the length of the laser pulse, to a final velocity inversely proportional to foil thickness. A 12-(SIGMA)m-thick foil attains a peak velocity of 0.2 km/s. Foils confined by water undergo most of their acceleration during the laser pulse and attain surface velocities three times greater than do air suspended foils of the same thickness. DOE

N84-11495# Physics Lab. RVO-TNO, The Hague (Netherlands). Researchgroep 1: Fysica.
EXPERIMENTAL AND THEORETICAL ANALYSIS OF THE RELATION BETWEEN RECEIVED SIGNAL POWER AND SIGNAL TO NOISE RATIO OF A HETERODYNE LASER DETECTION SYSTEM
J. Valk Feb. 1983 36 p refs In DUTCH; ENGLISH summary
(Contract A77/KL/052)
(PhL-1983-02; TDCK-77629) Avail: NTIS HC A03/MF A01

The relation between received signal power and signal to noise ratio (SNR) of a continuous CO2 laser heterodyne detection system was investigated. The system is designed for range finding. Periodic amplitude modulation of the laser beam is applied. Calculations are performed for the relation between the heterodyne SNR of the received signal and the SNR of the cross correlation function obtained after envelope detection. Only additive noise is considered; the multiplicative noise which occurs as fluctuations of signal strength is not treated. The SNR and the standard deviation of the range of a number of objects were used to estimate the minimal discernable signal. The received signal power is determined by the SNR of the measured correlation function for objects at different ranges. The difference between this power and the estimated signal power calculated from the target range, the estimated reflection etc. is discussed. Author (ESA)

N84-11496# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
FREQUENCY STABILIZATION OF CARBON DIOXIDE LASERS
Anders Gustavsson and Ingemar Renhorn May 1983 84 p refs
(FOA-C-30328-E1; ISSN-0347-3708) Avail: NTIS HC A05/MF A01; Research Inst. of National Defence, Stockholm KR 50

Means of stabilizing CO2 lasers, especially stabilizing to an external heated CO2 cell or the ouptut power of the laser are discussed. The theory of external cell laser induced fluorescence of heated CO2 gas is compared with experiment. The transition probability is calculated from observed absorption measurements at different pressures and applied to LIF measurements. A computerized feedback system for frequency stabilization of the laser was designed and applied to a low pressure CO2 laser with good inherent stability. Frequency stability of the order 1 MHz is achieved. Author (ESA)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N84-11497* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESILIENT SEAL RING ASSEMBLY WITH SPRING MEANS APPLYING FORCE TO WEDGE MEMBER Patent
William N. Myers and Leopold A. Hein, inventors (to NASA) Issued 18 Oct. 1983 5 p Filed 13 May 1982 Supersedes N82-25517 (20 - 16, p 2241)
(NASA-Case-MFS-25678-1; US-Patent-4,410,189;
US-Patent-Appl-SN-378533; US-Patent-Class-277-177;
US-Patent-Class-277-124; US-Patent-Class-277-164;
US-Patent-Class-277-190; US-Patent-Class-277-116.6) Avail: US Patent and Trademark Office CSCL 11A

A ring seal adapted for installation in an annular recess between a housing and a rotating or reciprocating shaft is described. The seal consists of a resilient ring cup member having a ring wedge member inserted in the center recess of the cup member to wedge the opposing lips of the cup member outwardly into a sealing relationship. A spring maintains the force against the wedge member. Official Gazette of the U.S. Patent and Trademark Office

N84-11498*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NUMERICAL METHODS AND COMPUTERS USED IN ELASTOHYDRODYNAMIC LUBRICATION
Bernard J. Hamrock and John H. Tripp (Case Western Research Univ., Cleveland) [1982] 21 p refs Presented at the 10th Leeds-Lyon Symp. on Tribology, Lyon, 6-9 Sep. 1983
(NASA-TM-83524; E-1797; NAS 1.15:83524) Avail: NTIS HC A02/MF A01 CSCL 11H

Some of the methods of obtaining approximate numerical solutions to boundary value problems that arise in elastohydrodynamic lubrication are reviewed. The highlights of four general approaches (direct, inverse, quasi-inverse, and Newton-Raphson) are sketched. Advantages and disadvantages of these approaches are presented along with a flow chart showing some of the details of each. The basic question of numerical stability of the elastohydrodynamic lubrication solutions, especially in the pressure spike region, is considered. Computers used to solve this important class of lubrication problems are briefly described, with emphasis on supercomputers. S.L.

N84-11499*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
IN-HOUSE WELDING STUDIES SUPPORTING THE PRELAUNCH ASSESSMENT OF THE STS-6 MAIN ENGINES
Lisa L. Hawkins Jun. 1983 28 p
(NASA-TM-82552; NAS 1.15:82552) Avail: NTIS HC A03/MF A01 CSCL 13H

Welding studies were undertaken as a result of problems with the Challenger engines. The process used to perform these welds on heat exchanger coils, and sample test data, are described. Recommendations for process improvement are included. Effort to simulate problem welds, as well as good welds, test data, and conclusions for the high pressure fuel turbopump are also are discussed. S.L.

N84-11500*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPECIAL CASES OF FRICTION AND APPLICATIONS
Faydor L. Litvin (Illinois Univ.) and John J. Coy Nov. 1983 18 p refs To be presented at the Design Eng. Show and Conf., Chicago, 26-29 Mar. 1984
(NASA-TM-83523; NAS 1.15:83523; AVRADCOM-TR-83-C-9; E-1857) Avail: NTIS HC A02/MF A01 CSCL 20K

Two techniques for reducing friction forces are presented. The techniques are applied to the generalized problem of reducing the friction between kinematic pairs which connect a moveable link to a frame. The basic principles are: (1) Let the moveable link be supported by two bearings where the relative velocities of the link with respect to each bearing are of opposite directions. Thus the resultant force (torque) of friction acting on the link due to the bearings is approximately zero. Then, additional perturbation of motion parallel to the main motion of the moveable link will require only a very small force; (2) Let the perturbation in motion be perpendicular to the main motion. Equations are developed which explain these two methods. The results are discussed in relation to friction in geared couplings, gyroscope gimbal bearings and a rotary conveyor system. Design examples are presented. Author

N84-11501*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR ADAPTING AN END EFFECTOR DEVICE REMOTELY CONTROLLED MANIPULATOR ARM Patent Application
Keith H. Clark, inventor (to NASA) Filed 30 Sep. 1983 14 p
(NASA-Case-MFS-25949-1; US-Patent-Appl-SN-538063) Avail: NTIS HC A02/MF A01 CSCL 13I

Apparatus for adapting a general purpose and effector device to a special purpose and effector is disclosed which includes an adapter bracket assembly which provides a mechanical and electrical interface between the end effector devices. The adapter bracket assembly includes an adapter connector post which interlocks with a diamond shaped gripping channel formed in closed jaws and of the general purpose end effector. The angularly intersecting surfaces of the connector post and gripping channel prevent any relative movement therebetween. containment webs constrain the outer finger plates of the general purpose jaws to prevent pitch motion. Electrical interface is provided by conical, self aligning electrical connector components carried by respective ones of said end effectors. NASA

N84-11502# Ecton Corp., Dayton, Ohio.
DEVELOPMENT OF A HIGH EFFICIENCY COMPRESSOR/EXPANDER FOR AN AIR CYCLE AIR CONDITIONING SYSTEM Final Report
Roger L. Summers and Ronald E. Smolinski 15 Nov. 1982 171 p refs
(Contract DAAK70-79-C-0042)
(AD-A130976) Avail: NTIS HC A08/MF A01 CSCL 13/1

This document presents the methods and procedures used and the results obtained in the design, fabrication, and testing of a rotary vane type compressor operated on air cycle thermodynamics. The history and results of the testing of a similar expander are summarized and the full report of that work is referenced. The machine design used was based on one patented by Ecton Corporation. The goal of the reported effort was to demonstrate the attainable efficiencies of these machines. Appropriate test rigs were assembled and the machines were tested at various operating conditions. The compressor testing did not achieve the full design speed because of time constraints but important data was obtained at 87% speed (3000 rpm). The maximum measured total efficiencies were 78% for the expander and 71% for the compressor. Various design improvements which may yield improved performance were identified and reported. GRA

N84-11503# Naval Air Engineering Center, Lakehurst, N.J. Ground Support Equipment Dept.
PREDICTION OF HYDRAULIC PUMP FAILURES THROUGH WEAR DEBRIS ANALYSIS Final Report
P. V. Ciekurs, S. A. Ropar, and V. T. Kelley 19 Jul. 1983 31 p refs
(WF41460000)
(AD-A131386; NAEC-92-171) Avail: NTIS HC A03/MF A01 CSCL 05/1

This report summarizes an investigation into the feasibility of monitoring hydraulic system wear debris characteristics in order to predict failures. The investigation utilized hydraulic pumps from an RA-5C aircraft hydraulic system and was monitored by spectrometric analysis and ferrography. Based on one relevant failure it was determined that ferrography can predict a failure of a pump prior to its occurence. Spectrometric results were not useful in the prediction. Author (GRA)

N84-11504# Sandia Labs., Albuquerque, N. Mex.
STATUS OF THE VERTICAL-AXIS WIND-TURBINE PROGRAM, 1983
R. H. Braasch 1983 11 p refs Presented at the American Solar Energy Society Meeting, Minneapolis, 1 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013098; SAND-82-2553C; CONF-830622-11) Avail: NTIS HC A02/MF A01

The vertical axis wind turbine program is discussed. Progress in aerodynamics research, structural dynamics research, data acquisition, and machine development is reviewed. DOE

N84-11505# Oak Ridge National Lab., Tenn.
EFFICIENCY TERMS FOR STIRLING-ENGINE SYSTEMS
J. L. Crowley Jun. 1983 30 p refs
(Contract W-7405-eng-26)
(DE83-014670; ORNL/CON-131) Avail: NTIS HC A03/MF A01

Thermal efficiencies are the primary indicators of the quality of design and performance of any energy system. However, in the case of Stirling engine systems, there is no widely accepted standard terminology in use, which would allow valid comparative evaluations to be made. To help overcome these problems, 14 efficiency terms that describe the performance of 6 combina-

tions of the basic system components - the heat source, the engine, and the load - are proposed. The efficiency terms are defined in terms of an energy accounting flowchart, which allows individual components or the entire system to be reported consistently so that the results of the various research groups may be properly compared. The appendixes contain three sets of sample calculations, two of which use test run data from an actual free-piston and a kinematic Stirling engine. DOE

N84-11506# Environmental Protection Agency, Ann Arbor, Mich. Control Technology Assessment and Characterization Branch.
LOW MILEAGE CATALYST EVALUATION WITH A METHANOL-FUELED RABBIT Interim Technical Report
Robert D. Wagner and Larry C. Landman May 1983 170 p
(PB83-241620; EPA-AA-CTAB/TA/83-5) Avail: NTIS HC A08/MF A01 CSCL 13B

A test program which was designed to evaluate various exhaust catalysts at low mileage on a pure methanol-fueled Volkswagen Rabbit automobile is summarized. Hydrocarbons, carbon monoxide, nitrogen oxides and formaldehyde emissions were measured to identify which catalysts are the best candidates for durability testing. Catalysts formulations that are eventually selected for durability testing should cost no more, and preferably less, than the original catalyst on the vehicle. In addition, all catalysts should provide the capability to meet the Federal Exhaust Emission Standards for hydrocarbon, carbon monoxide and nitrogen oxide. GRA

N84-11507# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
THE PERFORMANCE OF SMALL JET NOISE SILENCERS FOR INDUSTRIAL APPLICATIONS Final Report
Milo Dahl Apr. 1983 142 p refs
(PB83-234047; OSHA/RP-83/007) Avail: NTIS HC A07/MF A01 CSCL 13G

Commercially available small jet noise silencers were tested to determine their noise and mass flow reducing characteristics compared to an open pipe. Both exhaust silencers and ejector silencers were measured for sound power level and mass flow rate. In addition, the pressure patterns developed on a flat plate by the air flow from the ejector silencers were measured. The primary noise generating mechanism for both the open pipe and the silencing devices was due to turbulent mixing, which is dependent upon the velocity. In light of jet noise theory, it was shown that these silencers reduce turbulent noise levels by restricting the flow and creating interactions between smaller jets. The amount of noise reduction depended upon the design of the silencing device. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N84-11508*# Engineering and Economics Research, Inc., Vienna, Va.
A CONCEPTUAL STUDY OF AUTOMATIC AND SEMI-AUTOMATIC QUALITY ASSURANCE TECHNIQUES FOR ROUND IMAGE PROCESSING
30 Sep. 1983 89 p refs
(Contract NAS5-27513)
(NASA-CR-170610; NAS 1.26:170610; TR-10-83) Avail: NTIS HC A05/MF A01 CSCL 14D

This report summarizes the results of a study conducted by Engineering and Economics Research (EER), Inc. under NASA Contract Number NAS5-27513. The study involved the development of preliminary concepts for automatic and semiautomatic quality assurance (QA) techniques for ground image processing. A distinction is made between quality assessment and the more comprehensive quality assurance which includes decision making and system feedback control in response to quality assessment. B.W.

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N84-11509 Oklahoma Univ., Norman.
INELASTIC STABILITY OF TAPERED, SINGLY-SYMMETRIC BEAM-COLUMNS Ph.D. Thesis
Bijan Khaleghi 1982 165 p
Avail: Univ. Microfilms Order No. DA8306721

The elastic lateraltorsional buckling load of a clearly web-tapered member having unequal flanges and subjected to unequal end moments and axial load is determined. Triangular residual stress patterns in flanges and uniform tensile stress across the web are assumed to exist. The total potential energy functional for such a member is developed and the inelastic effects are included. Using the standard techniques and calculus of variations, the three differential equations describing the behavior of the member are derived and the natural and force boundary conditions are determined. Two of these equations, which are coupled, describe the out-of-plane behavior of the member. Central difference expressions are used to transform these two equations into difference equations. In order to determine the yield pattern at each station along the member, a method based on the solution of the equations of equilibrium is proposed. Dissert. Abstr.

N84-11510 Brown Univ., Providence, R. I.
A STUDY OF PLASTIC FLOW LOCALIZATION AND OTHER INSTABILITY PHENOMENA IN RATE-SENSITIVE DUCTILE SOLIDS Ph.D. Thesis
Jwo Pan 1982 121 p
Avail: Univ. Microfilms Order No. DA8228313

The localization of deformation into shear bands is commonly observed when solids deform into the plastic range. A number of theoretical approaches for explanation of the phenomena begin with the assumption of rate independent plastic flow. However, plastic flow via dislocation motion is an inherently rate-dependent process; therefore, the plastic rate sensitivity is considered here to investigate plastic flow localization phenomena. A framework for a linearized perturbation analysis in rate dependent materials is presented, and some numerical results of a shear layer model are shown to illustrate the retarding effects on shear localization due to rate sensitivity. The numerical results which show the retardation effects on flow localization due to the plastic rate sensitivity in porous solids under axisymmetric and plane strain conditions are also presented. The existence of plastic yield surface vertices is central to the predictions of the localization of deformation from the viewpoint of rate-independent plastic flow. Dissert. Abstr.

N84-11511 Texas Univ., Austin.
ANALYSIS OF NONCLASSICAL FRICTION LAWS FOR CONTACT PROBLEMS IN ELASTOSTATICS Ph.D. Thesis
Eduardo A. C. BorgesPires 1982 233 p
Avail: Univ. Microfilms Order No. DA8309117

A class of problems involving the equilibrium of linearly elastic bodies in contact on surfaces on which nonlocal and nonlinear friction laws are assumed to hold are investigated. An account of the physics of friction between metallic bodies in contact is given and arguments in support of the theory are presented. Variational principles for boundary value problems in elasticity in which such nonclassical laws hold are developed; existence of solutions to the nonlocal and nonlinear problems are established, and sufficient conditions for uniqueness of solutions are given. Also a quasi-static formulation is presented so that histories of loading

can be taken into account. The approximation of these problems by finite elements is considered; error estimates are derived, algorithms for friction problems are presented, and numerical solutions of several representative problems are given.
Dissert. Abstr.

N84-11512*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
WIDE RANGE WEIGHT FUNCTIONS FOR THE STRIP WITH A SINGLE EDGE CRACK
Thomas W. Orange [1982] 12 p refs Presented at the 16th Natl. Symp. on Fracture Mech., Columbus, Ohio, 15-18 Aug. 1983; sponsored by the Am. Soc. for Testing and Mater.
(NASA-TM-83478; E-1794; NAS 1.15:83478) Avail: NTIS HC A02/MF A01 CSCL 20K

A closed form expression for the weight function for a strip with a single edge crack is presented. The expression is valid for relative crack lengths from zero to unity. It is based on the assumption that the shape of an opened edge crack can be approximated by a conic section. The results agree well with published values for weight functions, stress intensity factors, and crack mouth opening displacements. S.L.

N84-11513*# Case Western Reserve Univ., Cleveland, Ohio.
EFFECT OF CRACK CURVATURE ON STRESS INTENSITY FACTORS FOR ASTM STANDARD COMPACT TENSION SPECIMENS Final Report
Javed Alam and Alexander Mendelson Oct. 1983 19 p refs
(Grant NsG-3251)
(NASA-CR-168280; NAS 1.26:168280) Avail: NTIS HC A02/MF A01 CSCL 20K

The stress intensity factors (SIF) are calculated using the method of lines for the compact tension specimen in tensile and shear loading for curved crack fronts. For the purely elastic case, it was found that as the crack front curvature increases, the SIF value at the center of the specimen decreases while increasing at the surface. For the higher values of crack front curvatures, the maximum value of the SIF occurs at an interior point located adjacent to the surface. A thickness average SIF was computed for parabolically applied shear loading. These results were used to assess the requirements of ASTM standards E399-71 and E399-81 on the shape of crack fronts. The SIF is assumed to reflect the average stress environment near the crack edge.
Author

N84-11514*# Textron Bell Aerospace Co., Buffalo, N. Y.
FORCED VIBRATION ANALYSIS OF ROTATING CYCLIC STRUCTURES IN NASTRAN Final Report
V. Elchuri, A. Michael Gallo, and S. C. Skalski Dec. 1981 176 p
(Contract NAS3-22533)
(NASA-CR-165429; NAS 1.26:165429; D2536-941007) Avail: NTIS HC A09/MF A01 CSCL 20K

A new capability was added to the general purpose finite element program NASTRAN Level 17.7 to conduct forced vibration analysis of tuned cyclic structures rotating about their axis of symmetry. The effects of Coriolis and centripetal accelerations together with those due to linear acceleration of the axis of rotation were included. The theoretical, user's, programmer's and demonstration manuals for this new capability are presented.
Author

N84-11515*# Textron Bell Aerospace Co., Buffalo, N. Y.
FINITE ELEMENT FORCED VIBRATION ANALYSIS OF ROTATING CYCLIC STRUCTURES Final Technical Report
V. Elchuri and G. C. C. Smith Dec. 1981 73 p refs
(Contract NAS3-22533)
(NASA-CR-165430; NAS 1.26:165430; D2536-941008) Avail: NTIS HC A04/MF A01 CSCL 20K

A capability was added to the general purpose finite element program NASTRAN Level 17.7 to conduct forced vibration analysis of tuned cyclic structures rotating about their axes of symmetry. The effects of Coriolis and centripetal accelerations together with those due to linear acceleration of the axis of rotation were included. The theoretical development of this capability is presented. S.L.

N84-11516# Battelle Columbus Labs., Ohio.
A CRITICAL REVIEW OF THE SHORT CRACK PROBLEM IN FATIGUE Interim Report, 1 Jul. 1981 - 30 Jun. 1982
B. N. Leis, M. F. Kanninen, A. T. Hopper, Jalees Ahmad, and David Broek Wright-Patterson AFB, Ohio AFWAL Jan. 1983 143 p refs
(Contract F33615-81-C-5051; AF Proj. 2420)
(AD-A131349; AFWAL-TR-83-4019) Avail: NTIS HC A07/MF A01 CSCL 20/11

Fatigue crack growth rate predictions based on linear elastic fracture mechanics can significantly underestimate the growth rates of smaller cracks. This study was undertaken to assess the significance of this short-crack phenomenon relative to a damage tolerance analysis of turbine engine components. An integrated program of experimentation and analysis was undertaken to identify the crack tip parameters that control fatigue crack growth rates for small cracks. The program began with a detailed critical review of the available literature. This report presents the results of the literature review. Author (GRA)

N84-11517# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
FATIGUE BEHAVIOR OF LONG AND SHORT CRACKS IN WROUGHT AND POWDER ALUMINUM ALLOYS Annual Report, 15 Apr. 1982 - 14 Apr. 1983
Robert O. Ritchie May 1983 97 p refs
(Grant AF-AFOSR-0181-82; AF Proj. 2306)
(AD-A131324; AFOSR-83-0616TR; UCB/RP/IE/A1013; AR-1)
Avail: NTIS HC A05/MF A01 CSCL 11/6

The fatigue behavior of short cracks, which are small compared to the scale of the microstructure, small compared to the scale of local plasticity or simply physically small (i.e., approximately < 1 mm), must be considered as one of the major factors limiting the application of defect-tolerant fatigue design for airframe and engine components. Accordingly, this program is aimed at identifying factors which govern the growth of such short cracks in a series of commercial aluminum alloys, with specific reference to behavior at near-threshold levels. In this report, the fundamental basis for the study is described in terms of (1) a detailed review of the factors which lead to differences in long and short crack behavior, and (2) a theoretical analysis of the influence of crack deflection and closure mechanisms on long and short crack behavior. It is concluded that many anomalies in the behavior of short fatigue cracks can be traced primarily to closure and deflection mechanisms, and accordingly an experimental program is prepresented with the objective of isolating these effects.
Author (GRA)

N84-11518# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
ELASTIC-PLASTIC ANALYSIS OF ANNULAR PLATE PROBLEMS USING NASTRAN Final Report
P. C. T. Chen May 1983 24 p refs Presented at 11th NASTRAN User's Colloq., San Francisco, 5-6 May 1982
(AD-A131293; ARLCB-TR-83023) Avail: NTIS HC A02/MF A01 CSCL 09/2

The plate elements of the NASTRAN code are used to analyze two annular plate problems loaded beyond the elastic limit. The first problem is an elastic-plastic annular plate loaded externally by two concentrated forces. The second problem is stressed radially by uniform internal pressure for which an exact analytical solution is available. A comparison of the two approaches together with an assessment of the NASTRAN code is given. Author (GRA)

N84-11519# SRI International Corp., Menlo Park, Calif.
RESPONSE OF CRACKS IN STRUCTURAL MATERIALS TO SHORT PULSE LOADS
H. Homma, D. A. Shockey, and Y. Murayama 1983 19 p
(Contract F49620-77-C-0059; AF Proj. 2306)
(AD-A131565; AFOSR-83-0679TR) Avail: NTIS

HC A02/MF A01 CSCL 20/11

Cracks in single edge notched strip specimens of 4340 steel, 1018 steel, and 6061-T 651 aluminum were loaded by tensile pulses of various amplitudes and durations to determine critical stresses for crack instability. The results were not well described by static fracture mechanics, but were in accord with behavior inferred from considerations of crack tip stress intensity histories. GRA

N84-11520# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

FATIGUE-CRACK PROPAGATION IN VISCOUS ENVIRONMENTS

J. L. Tzou, S. Suresh, and R. O. Ritchie Mar. 1983 15 p refs Presented at 4th Intern. Conf. on Mech. Behavior of Mater., (ICM 4), Stockholm, 15 Aug. 1983

(Contract DE-AC03-76SF-00098)

(DE83-011741; LBL-15780; CONF-830832-2) Avail: NTIS HC A02/MF A01

The effect of dehumidified silicone and paraffin oils with viscosities from 5 to 60,000 cS, on fatigue crack propagation in a low alloy steel is examined at both near-threshold (less than or equal to 10(+6) mm/cycle) and higher (approx. 10(+6) to 10(+3) mm/cycle) growth rates. Results show that at low load ratios crack growth rates in oil exceed those in moist air at near-threshold levels, whereas at higher growth rates crack propagation in moist air is considerably faster than in oil. Such observations are discussed in terms of three mechanisms specific to dry oil environments: suppression of moisture-induced hydrogen embrittlement and/or metal dissolution, minimization of oxide-induced crack closure and hydrodynamic wedging effects of the viscous fluid within the crack. DOE

N84-11521# Sandia Labs., Albuquerque, N. Mex.

CHARACTERIZATION OF CONSERVATISM IN MECHANICAL SHOCK TESTING OF STRUCTURES

May 1983 191 p refs

(Contract DE-AC04-76DP-00789)

(DE83-013524; SAND-82-2186) Avail: NTIS HC A09/MF A01

Field and test environments are characterized allowing to make quantitative statements about the conservatism of a shock test. Alternative characterizations of shock transients are introduced. A method to characterize both field and laboratory shock environments is developed which can be used for any type of shock characterization to account for the variability in the description of the environments. Conservatism between the field and laboratory shock environments is then quantified in terms of the index of conservatism (IOC). This measure of conservatism possess the attribute of incorporating information on the uncertainty in either of the shock environments. It is shown that control of the level of conservatism in a shock test for a given response characterization is possible through the derivation of test modification factors associated with desired IOC values. The shock data analysis procedures are demonstrated using field and shock laboratory data measured on a simple cantilever beam structure. The development of this new method for defining conservatism in mechanical shock testing provides a capability for controlling the degree of conservatism in shock tests. DOE

N84-11522# Sandia Labs., Albuquerque, N. Mex.

DYNAMIC HETEROGENEOUS RESPONSE OF ALUMINUM AND COPPER TO STRESS WAVES

1983 4 p refs Presented at Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18 Jul. 1983

(Contract DE-AC04-76DP-00789)

(DE83-015229; SAND-83-14320; CONF-830719-15) Avail: NTIS HC A02/MF A01

Holographic interferometry is used to measure the time- and space-resolved dynamic response of materials to stress waves. For free surface accelerations in the range - 10(11) cm/sec(2) to 10(1)0 cm/sec(2) and pressures less than 2 GPa it was that the grain structures of the polycrystalline metals aluminum and copper are correlated to the observed heterogeneous response. The response depends on the grain size, whether the material is being compressed or unloaded from a shock-compressed state and the rate of compression and decompression. Other factors, such as material strength, viscosity, and wave interactions, that may influence heterogeneous response are discussed. DOE

N84-11523# UNC Nuclear Industries, Inc., Richland, Wash.

VIBRATION MONITORING USING A COMPUTER-NETWORK APPROACH

T. P. Harrington, S. P. Roblyer, and H. Toffer 1983 16 p refs Presented at the 9th Bien. Conf. on Mech. Vibration and Noise, Dearborn, Mich., 12 Sep. 1983

(Contract DE-AC06-76BL-01857)

(DE83-012123; UNI-SA-106; CONF-830928-1) Avail: NTIS HC A02/MF A01

An approach to vibration monitoring utilizing microprocessor based data acquisition stations, a large minicomputer, and a computer network methodology is being developed. In this approach, semi-autonomous data collection stations referred to as satellite stations are located near each concentration of machinery to be monitored. The satellite stations provide near continuous monitoring of the machinery. They are linked to the minicomputer using voice grade telephone circuits and hardware and software specially designed for network communications. The communications link between the satellite stations and the minicomputer permits data and programs to be transmitted between the units, for example, vibration data can be collected by the satellite stations and transmitted to the minicomputer for long-term trend analysis or sophisticated signature analysis. DOE

N84-11524# Sandia Labs., Albuquerque, N. Mex. Solid Dynamics Dept.

NUMERICAL MODELING OF DYNAMIC MATERIAL RESPONSE

Lee Davison 1983 7 p refs Presented at the Am. Phys. Soc. Meeting on Shock Waves in Condensed Media, Santa Fe, N. Mex., 18 Jul. 1983

(Contract DE-AC04-76DP-00789)

(DE83-016233; SAND-83-0974C; CONF-830719-36) Avail: NTIS HC A02/MF A01

Most analyses of the propagation of shock waves in condensed matter are based on the continuum approximation, and are conducted numerically. This approach not only lends itself to the solution of practical problems in complex geometrical settings but also permits analyzing the physical response of materials in considerable detail, using theories of corresponding complexity. The responses of condensed matter to shock compression vary widely with the greatest variation being manifest in the regime of moderate compression - that in which inelastic effects are dominant and subtle changes in material microstructure have a significant influence on mechanical responses. Materials of interest cover the range from simple liquids and monocrystals to the most complex natural and synthetic composites. They exhibit viscoelasticity, plasticity, viscoplasticity, compaction, phase transformation, electromagnetic activity, chemical decomposition, fracture, fragmentation, and other responses. In many cases, these responses involve nuances unique to the shock process. DOE

N84-11525# Ames Lab., Iowa.

SIMPLIFIED METHODS FOR THE INELASTIC ANALYSIS OF STIFFENED SHELLS

F. S. Fanous and L. F. Greimenn 1983 9 p refs Presented at the 7th Intern. Conf. on Structural Mech. in Reactor Technol., Chicago, 22 Aug. 1983

(Contract W-7405-eng-82)

(DE83-016518; IS-M-417; CONF-830805-47) Avail: NTIS HC A02/MF A01

Despite the extreme precautions that are usually considered in the design and construction of nuclear power plant containment vessels, there is a non-zero probability of radioactivity leakage from the containment. In view of this, there is a need to define the structural capability to withstand various types of loading. The uncertainty of the containment resistance is assessed. The vessel resistance under uniform internal static pressure is predicted.

Strains, more particularly, the maximum circumferential membrane strain is selected as basis of failure indication. A value of two is used as a lower limit of the strain ductility capacity. Twelve axisymmetric models are analyzed using the finite element technique and the results compared to the simplified methods. Additionally, an actual containment vessel is presented to illustrate the applicability of the methods. The results are found to be sufficiently accurate to define the resistance of the containment vessel. DOE

N84-11526# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Bereich Neue Technologie.
GROWIAN ROTORBLADES: PRODUCTION DEVELOPMENT, CONSTRUCTION AND TEST Final Report, Sep. 1982
Hans Martin Thiele Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 76 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-111; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

Development and construction of three 50 m rotor blades for a 3 MW wind turbine are described. A hybrid concept was chosen, i.e., a load carrying inflexible steel spar and a glass fiber reinforced plastic skin. A test blade was constructed and static loading tests, dynamic vibration tests and fatigue tests on critical welds as well as at the connection between spar and blade skin were performed. All test results show good accordance with calculated values, and were taken into consideration during the construction of two rotor blades. Author (ESA)

42 GEOSCIENCES (GENERAL)

N84-11527*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEODYNAMICS BRANCH RESEARCH REPORT, 1982
W. D. Kahn, ed. and S. C. Cohen, ed. Sep. 1983 105 p refs (NASA-TM-85078; NAS 1.15:85078) Avail: NTIS HC A06/MF A01 CSCL 08G

The research program of the Geodynamics Branch is summarized. The research activities cover a broad spectrum of geoscience disciplines including space geodesy, geopotential field modeling, tectonophysics, and dynamic oceanography. The NASA programs which are supported by the work described include the Geodynamics and Ocean Programs, the Crustal Dynamics Project, the proposed Ocean Topography Experiment (TOPEX) and Geopotential Research Mission. The individual papers are grouped into chapters on Crustal Movements, Global Earth Dynamics, Gravity Field Model Development, Sea Surface Topography, and Advanced Studies. S.L.

N84-11528# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
STUDIES OF SATELLITE GEODESY, VERY LONG BASELINE INTERFEROMETRY (VLBI) AND GEODETIC MEASURING TECHNIQUES [ARBEITEN ZUR SATELLITENGEODAESIE, VLBI UND GEODAETISCHEN MESSTECHNIK]
Walter Hofmann and Hans Zetsche 1982 158 p refs In GERMAN; ENGLISH summary
(Bonn-Mitt-65; ISSN-0723-4325) Avail: NTIS HC A08/MF A01

An experiment to measure microkinematic processes on the surface of the Earth is presented. Interdisciplinary aspects of technical measurements on building sites are discussed. The precision and utilization of a digital barometer based on the piezoresistive principle are investigated. Variations of ocean surfaces are studied from ERS-1 altimeter data for repetitive orbits. Measuring methods using automatic seconds theodolites are presented. A geoid profile across the Alps is determined using Doppler measurements of the US Navy Navigation Satellite System. A hygrometer, a distance meter and an autoranger are tested. The Mark 3-VLBI data analysis system is discussed. For individual titles, see N84-11529 through N84-11537.

N84-11529# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
EXPERIMENT TO MEASURE MICROKINEMATIC PROCESSES ON THE SURFACE OF THE EARTH [EIN EXPERIMENT ZUR MESSUNG MIKROKINEMATISCHER PROZESSE AN DER ERDOBERFLAECHE] **c46**
M. Bonatz *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 1-8 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

The problems involved in resolving tilt measurements on the Earth's surface are discussed. A hydrostatic apparatus was developed for tilt measurements on the surface of the Earth. The results of several months of measurements are encouraging. The instrument temperature is empirically reduced to 30% of its initial value by a built-in compensation system. A servomotor is used to avoid temperature induced drift in the rotation of the measuring spindle during calibration. The calibration characteristic is found to be linear. Author (ESA)

N84-11530# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
INTERDISCIPLINARY ASPECTS OF TECHNICAL MEASUREMENTS [INTERDISZIPLINAERE ASPEKTE BEI TECHNISCHEN MESSUNGEN] **c43**
L. Hallermann *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 9-18 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

Measuring practices on building sites are reviewed, showing that more and more interdisciplinary cooperation is required. Author (ESA)

N84-11531# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
INVESTIGATION OF THE PRECISION AND UTILIZATION OF A DIGITAL BAROMETER BASED ON THE PIEZORESISTIVE PRINCIPLE [UNTERSUCHUNG ZUR GENAUIGKEIT UND DEN EINSATZMOEGLICHKEITEN EINES DIGITALBAROMETERS NACH DEM PIEZORESISTIVEN PRINZIP] **c35**
H. Ingensand *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 19-32 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

A barometer based on the piezoresistive principle using cheap pressure sensors with digital display was investigated for automatic pressure registration. The precision corresponds to that of existing devices. For elastic aftereffects it surpasses existing systems and makes possible a dynamic measuring value registration, as is demonstrated in a motorized barometric height measuring experiment. The results of the investigation show that classical measuring instruments can be replaced due to the development of cheap pressure sensors. Author (ESA)

N84-11532# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
VARIATIONS OF OCEAN SURFACES FROM ERS-1 ALTIMETER DATA FOR REPETITIVE ORBITS [AENDERUNGEN DER OZEANOBERFLAECHE AUS DEN ERS-1 ALTIMETERDATEN FUER REPETITIVE] **c43**
K. R. Koch and D. Fritsch *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 33-38 refs In GERMAN; ENGLISH summary (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

A distinction was made between geoid undulations and the levels of ocean surfaces in order to discern the geoid and to eliminate the errors of orbit calculation and altimeter measurements. Methods to eliminate the errors of the altimeter measurements of

ERS-1 and the errors of the orbit computations for ERS-1, and to discriminate between the geoid undulations and the sea surface topography in the altimeter data are discussed. Author (ESA)

N84-11533# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
NEW OPPORTUNITIES FOR OLD MEASURING METHODS BY USING AUTOMATIC SECONDS THEODOLITES (AST) [NEUE CHANCEN FUER ALTE MESSMETHODEN DURCH DEN EINSATZ VON AUTOMATISCHEN SEKUNDENTHEODOLITEN] **c43**
H.-J. Larisch and M. Scherer *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 39-60 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

Measuring methods and application domains in which the AST are superior to optical théodolites are presented. Determination of distances in space and three-dimensional coordinates from contact-free measurement in engineering geodesy; precision distance measurement by observation of parallactic angles; and AST in astrogeodetic measuring systems are mentioned. Author (ESA)

N84-11534# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
DETERMINATION OF A GEOID PROFILE ACROSS THE ALPS USING DOPPLER MEASUREMENTS OF THE US NAVY NAVIGATION SATELLITE SYSTEM (NNSS) [UEBER DIE BESTIMMUNG EINES GEOIDPROFILS DURCH DIE ALPEN MIT HILFE VON DOPPLERMESSUNGEN IM NNSS] **c43**
Franz Josef Lohmar, Claudio Marchesini (Trieste Univ., Italy), and Hermann Seeger *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 61-80 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

An independent and direct method to derive geoid undulations using Doppler measurements of given ellipsoidal and orthometric altitude is presented. It uses a profile across the Alps which follows the 13th degree of longitude. On the basis of parameter estimation a Doppler measured geoid height accuracy of + or - 0.2 m is deduced. A realistic global profile evolution is found. In order to eliminate difficulties in the transformation of Doppler results, Doppler measurements must be carried out simultaneously by at least three reference stations with reliably determined terrestrial coordinates. Author (ESA)

N84-11535# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
MODERN HYGROMETER. IS IT AN ALTERNATIVE TO PSYCHROMETRIC HUMIDITY MEASUREMENT? [MODERNE HYGROMETER. EINE ALTERNATIVE ZUR PSYCHROMETRISCHEN FEUCHTEMESSUNG?] **c47**
W. Schauerte *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 81-107 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

A humidity measurement system (Type HMI 14 with probe HMP 14A) was tested. Accuracy is + or - 0.5% relative humidity (rh). Results can be reproduced within + or - 1.0% rh. Hysteresis due to dielectricum inertia can be demonstrated (accuracy above 2.0% rh). Between two calibrations, the residual error corrections for arbitrary humidity values can be made by linear interpolation. Taking all the single error components into account, the system determines any humidity value with an accuracy of + or - 1.0 to 1.2% rh, without considering the uncertainty in the indication system. The accuracies given by the manufacturer are confirmed in the domain between 0 and 75% rh, and are found to be better in the domain between 75 and 100%. Author (ESA)

N84-11536# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
FIRST EXPERIENCES WITH THE MARK 3 VERY LONG BASELINE INTERFEROMETRY (VLBI) DATA ANALYSIS SYSTEM [ERSTE ERFAHRUNGEN MIT DEM MARK 3-VLBI-DATENAUSWERTESYSTEM] **c43**
H. Schuh *In its* Studies on Satellite Studies, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 109-129 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

A VLBI data analysis system is presented. The HP 1000 F computer system, VLBI-data-base handler, and the programs completing the data base are described. The parameters (geodetic-geophysical VLBI model unknowns) are estimated by the least squares method. The advantages of the system are its well structured data base, the logical construction of analysis system and programs, its parameter estimation procedure, and its interactive and graphical possibilities. The disadvantages are a lack of flexibility and clearness, and the dependence of the data analysis on the user's experience. The system meets almost all the requirements of the standard VLBI-problems. Author (ESA)

N84-11537# Technische Hochschule, Aachen (West Germany). Inst. fuer Geodaesie.
INVESTIGATION OF THE DISTANCEMETER GEODIMETER 122 AND THE AUTORANGER-A [UNTERSUCHUNG DER DISTANZMESSER GEODIMETER 122 UND AUTORANGER-A] **c35**
Bertold Witte *In* Bonn Univ. Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 131-148 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

The AGA 122 geoidimeter and the Autoranger-A were compared. The range finding measurement parts were calibrated, and resolving power and phase inhomogeneities of the instruments were determined. The results confirm the manufacturer's specifications of the AGA 120. An accuracy increase due to a higher (0.1 mm) display resolution is not observed. The Autoranger-A standard deviation is 1 mm in the investigated range (42 0 m), while it is 2 to 3 mm for the Geodimeter 122. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N84-11538 Minnesota Univ., Minneapolis.
EVALUATION OF SOME REMOTE SENSING TECHNIQUES FOR OIL AND CROP MANAGEMENT Ph.D. Thesis
Pierre Camille Robert 1983 131 p
Avail: Univ. Microfilms Order No. DA8308116

Color infrared aerial photography (CIR) is a fairly common near real time management tool in irrigated, cash crop, and orchard farming. Its use has seen a developing interest in rain-fed areas of corn and soybean production. The objective of this study is a feasibility test of using some remote sensing techniques, primarily CIR aerial photography, as a practical, efficient management tool on nonirrigated corn and soybean fields. Limitations and requirements in equipment (cameras, films), flight, scale, data processing, photointerpretation (procedures, ground information), soil and crop management feature interpretation, and cost effectiveness are reviewed from the project experience. The study was conducted on fifteen farms located in southwestern Minnesota. Detection, location of soil and crop management features or problems were principally interpreted on low altitude aerial photography, complemented by collateral data (e.g., soil maps, field cultural practice records) and ground surveys. Dissert. Abstr.

N84-11539 Wisconsin Univ., Madison.
EVALUATION OF CONTROLLING LOW ALTITUDE AERIAL PHOTOGRAPHY USING HIGH ALTITUDE AEROTRIANGULATION Ph.D. Thesis
Steve Dale Johnson 1983 461 p
Avail: Univ. Microfilms Order No. DA8306682

Analytical aerotriangulation is a method of densifying ground control by photogrammetric methods. Variations in procedures include forming assemblies of strip, stereomodel, or photographic units. Coordinate transformation functions are used to assemble the units into strips or blocks. When redundant measurements are available, a least squares is used to simultaneously fit the photogrammetric units to one another, and to the known ground control positions. A fundamental problem in aerotriangulation is to maximize the distance bridged between known control points while controlling the propagation of errors in the photogrammetric assembly. Applications of photogrammetry, especially in highway mapping and engineering, often result in high and low altitude photography being used for the same project. Procedures are developed for transferring aerotriangulated pass points from high altitude photography to low altitude photography. Their photogrammetrically derived coordinates are used as supplemental control for the low altitude photography. Dissert. Abstr.

N84-11540 Deutsche Gesellschaft fuer Forschung und Technologie e.V., Bochum (West Germany).
THE ROLE OF THE GEOID IN HIGH PRECISION GEODESY AND OCEANOGRAPHY
Chris Rizols 1982 66 p refs Sponsored by Alexander von Humboldt Foundation
(Ser-A-96; ISBN-3-7696-8178-9; ISSN-0065-5309) Copyright. Avail: Issuing Activity

The effect of sea surface topography on the Molodenskii boundary value problem (BVP); and the formulation of a free BVP solution to + or - 10 cm precision from surface gravity data that cannot be considered referenced to a unique vertical datum surface are discussed. The relevance of high precision BVP solutions from surface gravity data given that 70% of the Earth's surface has been measured by satellite altimetry is considered. The role of concepts such as the geoid and geodetic techniques such as altimetry in ocean dynamical studies is examined. The lack of a model of the Earth's gravity field with the precision required for satellite remote sensing of ocean dynamics, and the impossibility of defining the geocentric position of an altimetry satellite at the decimeter level globally on a routine basis are stressed.
Author (ESA)

N84-11541 Deutsche Gesellschaft fuer Forschung und Technologie e.V., Bochum (West Germany).
A CONTRIBUTION TO 3D-OPERATIONAL GEODESY. PART 3: OPERA, A MULTIPURPOSE PROGRAM FOR OPERATIONAL ADJUSTMENT OF GEODETIC OBSERVATIONS OF TERRESTRIAL TYPE
Guenter Hein and Herbert Landau 1983 83 p refs Sponsored by Deutsche Forschungsgemeinschaft
(Ser-B-264-Pt-3; ISBN-3-7696-8557-1; ISSN-0065-5317) Copyright. Avail: Issuing Activity

A program system that combines all geodetic measurements in one unified model is presented. It is shown that potential differences can be combined with other geodetic observations in order to build a three dimensional geodesy. Since astronomical observations can be interchanged with gravity measurements, the astronomical values in a combination of both types can be controlled. Separation of refraction influences from those of the plumbline deflections in the observations is improved. Extension to the fourth dimension is discussed. Author (ESA)

N84-11542 Ecole Polytechnique Federale de Lausanne (Switzerland). Lab. d'Hydraulique.
[ACTIVITIES IN HYDRAULICS] Annual Report, 1982 [RAPPORT ANNUEL 1982 DU LABORATOIRE D'HYDRAULIQUE]
1982 82 p refs Partly in ENGLISH, FRENCH, and GERMAN Avail: Issuing Activity

Hydraulics of steep, mobile bed channels; sedimentation of reservoirs; internal motion of lakes; and the aerodynamics of the lower atmosphere above a lake were studied. Hydraulic engineering projects, including a dam on Lake Geneva and river level monitoring for flood prediction are summarized. Author (ESA)

N84-11543*# Rochester Inst. of Tech., N. Y. Coll. of Graphic Arts and Photography.
LANDSAT 4 BAND 6 DATA EVALUATION Quarterly Report
15 Jun. 1983 3 p ERTS
(Contract NAS5-27323)
(E84-10001; NASA-CR-174516; NAS 1.26:174516; QR-3) Avail: NTIS HC A02/MF A01 CSCL 05B

Computer modelled atmospheric transmittance and path radiance values were compared with empirical values derived from aircraft underflight data. Aircraft thermal infrared imagery and calibration data were available on two dates as were corresponding atmospheric radiosonde data. The radiosonde data were used as input to the LOWTRAN 5A code. The aircraft data were calibrated and utilized to generate analogous measurements. The results of the analysis indicate that there is a tendancy for the LOWTRAN model to underestimate atmospheric path radiance and overestimate atmospheric transmittance. M.G.

N84-11544*# Earth Satellite Corp., Chevy Chase, Md.
STUDY OF LANDSAT-D THEMATIC MAPPER PERFORMANCE AS APPLIED TO HYDROCARBON EXPLORATION Quarterly Progress Report, 7 Jun. - 7 Oct. 1983
7 Oct. 1983 3 p ERTS
(Contract NAS5-27384)
(E84-10003; NASA-CR-174518; NAS 1.26:174518; QPR-4) Avail: NTIS HC A02/MF A01 CSCL 08B

Activities in support of thematic mapper 'A'-tape analysis, field work in the Cement-Velma, Oklahoma areas, and continued interpretation and assessment of imagery of various test sites are reported. The objectives of the A-tape analysis are: (1) to examine the radiometric loss of data quality introduced by resampling to P-tape format; (2) to seek a better distriping of the image by replacing the NASA matching of radiometry to on-board calibration data with an EarthSat matching of the histograms for each of the sixteen detectors, processing separately for forward and backward scanner sweeps; and (3) to produce an image with improved appearance and improved radiometeric qualities. M.G.

N84-11545*# California Univ., Santa Barbara. Dept. of Geography.
LANDSAT-D INVESTIGATIONS IN SNOW HYDROLOGY Quarterly Progress Report, 1 Jul. - 30 Sep. 1983
Jeff Dozier 30 Sep. 1983 2 p ERTS
(Contract NAS5-27463)
(E84-100004; NASA-CR-174519; NAS 1.26:174519) Avail: NTIS HC A02/MF A01 CSCL 08L

Progress on the registration of TM data to digital topographic data; on comparison of TM, MSS and NOAA meteorological satellite data for snowcover mapping; and on radiative transfer models for atmospheric correction is reported. Some methods for analyzing spatial contiguity of snow within the snow covered area were selected. The methods are based on a two-channel version of the grey level co-occurence matrix, combined with edge detection derived from an algorithm for computing slopes and exposures from digital terrain data. M.G.

N84-11546*# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
USE OF THERMAL INERTIA DETERMINED BY HCMM TO PREDICT NOCTURNAL COLD PRONE AREAS IN FLORIDA Final Report, Mar. 1981 - Mar. 1983
L. H. Allen, Jr., Principal Investigator Oct. 1983 74 p refs Original contains color imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20770. Domestic users send orders to "Attn: National Space Science Data Center"; non-domestic users send orders to "Attn: World Data Center A for Rockets and Satellites". HCMM
(Contract NAS5-26453)
(E84-10005; NASA-CR-174520; NAS 1.26:174520) Avail: NTIS HC A03/MF A01 CSCL 05B

Pairs of HCMM day-night thermal infrared (IR) data were selected during the 1978-79 winter to examine patterns of surface temperature and thermal inertia (TI) of peninsular Florida. The

GOES and NOAA-6 thermal IR, as well as National Climatic Center temperatures and rainfall, were also used. The HCMM apparent thermal inertia (ATI) images closely corresponded to the general soil map of Florida, based on soil drainage classes. Areas with low ATI overlay well-drained soils, such as deep sands and drained organic soils, whereas with high ATI overlay areas with wetlands and bodies of water. The HCMM ATI images also corresponded well with GOES-detected winter nocturnal cold-prone areas. Use of HCMM data with Carlson's energy balance model showed both high moisture availability (MA) and high thermal inertia (TI) of wetland-type surfaces and low MA and low TI of upland, well-drained soils. Since soil areas with low TI develop higher temperatures during the day, then antecedent patterns of highest maximum daytime surface temperature can also be used to predict nocturnal cold-prone areas in Florida. M.G.

N84-11547*# Kansas Univ., Lawrence. Space Technology Center.
MICROWAVE REMOTE SENSING OF SNOW EXPERIMENT DESCRIPTION AND PRELIMINARY RESULTS
Fawwaz T. Ulaby, Principal Investigator, W. H. Stiles, and B. C. Hanson Jun. 1977 123 p refs ERTS
(Contract NAS5-23777)
(E84-10009; NASA-CR-174524; NAS 1.26:174524; RSL-TR-340-1) Avail: NTIS HC A06/MF A01 CSCL 08L

The active and passive microwave responses to snow were investigated at a site near Steamboat Springs, Colorado during the February and March winter months. The microwave equipment was mounted atop truck-mounted booms. Data were acquired at numerous frequencies, polarizations, and angles of incidence for a variety of snow conditions. The experiment description, the characteristics of the microwave and ground truth instruments, and the results of a preliminary analysis of a small portion of the total data volume acquired in Colorado are documented. M.G.

N84-11548*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AIRCRAFT REMOTE SENSING OF SOIL MOISTURE AND HYDROLOGIC PARAMETERS, TAYLOR CREEK, FLORIDA, AND LITTLE RIVER, GEORGIA, 1979 DATA REPORT
T. J. Jackson, T. J. Schmugge, L. H. Allen, Jr. (Florida Univ., Gainesville), P. ONeill, R. Slack (EPA, Athens, Ga.), J. Wang, and E. T. Engman Sep. 1981 39 p refs Prepared in cooperation with Agricultural Research Service, Beltsville, Md. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E84-10010; NASA-TM-85468; NAS 1.15:85468; ARR-NE-13) Avail: NTIS HC A03/MF A01 CSCL 08H

Experiments were conducted to evaluate aircraft remote sensing techniques for hydrology in a wide range of physiographic and climatic regions using several sensor platforms. The data were collected in late 1978 and during 1979 in two humid areas--Taylor Creek, Fla., and Little River, Ga. Soil moisture measurements and climatic observations are presented as well as the remote sensing data collected using thermal infrared, passive microwave, and active microwave systems. Author

N84-11549*# California Univ., Davis. Dept. of Electrical and Computer Engineering.
LANDSAT-D THEMATIC MAPPER IMAGE DIMENSIONALITY REDUCTION AND GEOMETRIC CORRECTION ACCURACY Quarterly Status and Technical Progress Report, 3 Jun. - 3 Sep. 1983
Gary E. Ford, Principal Investigator 3 Sep. 1983 7 p ERTS
(Contract NAS5-27577)
(E84-10011; NASA-CR-174526; NAS 1.26:174526) Avail: NTIS HC A02/MF A01 CSCL 08B

When principal component analysis of a subscene of a section of the Sacramento River showed lower correlation among the TM spectral components that were observed for the MSS spectral components, principal component analysis was applied to a LANDSAT 2 MSS subscene of the same area for comparison purposes. Correlation coefficient matrices indicate the pairwise similarity and correlation of the data for the spectral components. The principal components transformation matrix, indicates the weights applied to the original components to generate the transformed components. The first two TM components can be described as visible and near infrared. For the MSS data, the first transformed component is roughly the average of the four original components. The second transformed component is roughly the difference between the visible and infrared components. Tables show that 97.0% of the variance in an MSS image is contained in only two transformed components. A.R.H.

N84-11550*# Rochester Inst. of Tech., N. Y. School of Photographic Arts and Sciences.
LANDSAT 4 BAND 6 DATA EVALUATION Quarterly Report
15 Sep. 1983 8 p ERTS
(Contract NAS5-27323)
(E84-10012; NASA-CR-174527; NAS 1.26:174527; QR-4) Avail: NTIS HC A02/MF A01 CSCL 14B

Multiple altitude TM thermal infrared images were analyzed and the observed radiance values were computed. The data obtained represent an experimental relation between preceived radiance and altitude. A LOWTRAB approach was tested which incorporates a modification to the path radiance model. This modification assumes that the scattering out of the optical path is equal in magnitude and direction to the scattering into the path. The radiance observed at altitude by an aircraft sensor was used as input to the model. Expected radiance as a function of altitude was then computed down to the ground. The results were not very satisfactory because of somewhat large errors in temperature and because of the difference in the shape of the modeled and experimental curves. A.R.H.

N84-11551*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
INVESTIGATION OF RADIOMETRIC PROPERTIES OF THE LANDSAT-4 MULTISPECTRAL SCANNER Final Report, 22 Jul. 1982 - 21 Aug. 1983
William A. Malila, Principal Investigator and Daniel P. Rice Aug. 1983 54 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-27254)
(E84-10013; NASA-CR-174528; NAS 1.26:174528; ERIM-163200-3-F) Avail: NTIS HC A04/MF A01 CSCL 14B

The radiometric data quality of the LANDSAT 4 multispectral scanner (MSS) was examined using several LANDSAT 4 frames. It was found that LANDSAT 4 MSS produces high-quality data of the caliber experienced with previous LANDSATS. For example, the detector equalization procedure worked well, leaving a residual banding effect of about 0.3 digital counts RMS, close to the theoretical minimum value of quantization error. Nevertheless, artifacts of the data were found, two of which were not experienced in previous MSS data. A low-level coherent noise effect was observed in all bands, with a magnitude of about 0.5 digital counts and a frequency of approximately 28 KHz (representing a wavelength of about 3.6 pixels); a substantial increase in processing complexity would be required to reduce this artifact in the data. Also, a substantial scan-length variation (of up to six pixels) was noted in MSS data when the TM sensor was operating; the LANDSAT 4 correction algorithms being applied routinely by the EROS Data Center to produce a p-type data should remove most of this variation. Between-satellite calibrations were examined in paired LANDSAT 3 and LANDSAT 4 MSS data sets, which were closely matched in acquisition time and place. Radiometric comparisons showed that all bands were highly linear in digital counts, and a well-determined linear transformation between the MSS's was established. M.G.

N84-11552*# Arizona Univ., Tucson.
LANDSAT-4 THEMATIC MAPPER MODULATION TRANSFER FUNCTION (MTF) EVALUATION Progress Report, 15 Jun. - 15 Sep. 1983
Robert Schowengerdt, Principal Investigator 16 Sep. 1983 20 p

Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E84-10014; NASA-CR-174529; NAS 1.26:174529) Avail: NTIS HC A02/MF A01 CSCL 08B

A power spectrum (PS) analysis technique was used to compare thematic mapper (TM) A and P-tape data for a Washington, DC scene in two orthogonal directions, along scan and along track. The resulting effective modulation transfer functions (MTF) between the A and P data are repeatable from area to area and consistent with theoretical expectations. The average x-direction (along scan) MTF calculated with the PS technique is compared to the MTF of the cubic convolution resampling function used to create P data from A data. The two curves are nearly identical, indicating that the major factor affecting the image quality of P data relative to A data is the cubic convolution resampling. M.G.

N84-11553*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
LAND USE INVENTORY OF SALT LAKE COUNTY, UTAH FROM COLOR INFRARED AERIAL PHOTOGRAPHY 1982
Kevin P. Price, Reynold D. Willie, Douglas J. Wheeler, and Merrill K. Ridd Jul. 1983 25 p refs ERTS
(Grant NAGw-95)
(E84-10015; NASA-CR-174530; NAS 1.26:174530; CRSC-83-2) Avail: NTIS HC A02/MF A01 CSCL 08B

The preparation of land use maps of Salt Lake County, Utah from high altitude color infrared photography is described. The primary purpose of the maps is to aid in the assessment of the effects of urban development on the agricultural land base and water resources. The first stage of map production was to determine the categories of land use/land cover and the mapping unit detail. The highest level of interpretive detail was given to the land use categories found in the agricultural or urbanized portions of the county; these areas are of primary interest with regard to the consumptive use of water from surface streams and wells. A slightly lower level of mapping detail was given to wetland environments; areas to which water is not purposely diverted by man but which have a high consumptive rate of water use. Photos were interpreted on the basis of color, tone, texture, and pattern, together with features of the topographic, hydrologic, and ecological context. M.G.

N84-11554*# EROS Data Center, Sioux Falls, S. Dak.
LANDSAT 4 INVESTIGATIONS OF THEMATIC MAPPER AND MULTISPECTRAL SCANNER APPLICATIONS Quarterly Report
Donald T. Lauer, Principal Investigator 24 Oct. 1983 3 p ERTS
(NASA Order S-10757-C)
(E84-10017; NASA-CR-174544; NAS 1.26:174544) Avail: NTIS HC A02/MF A01 CSCL 14B

The utility of TM data natural resource assessment was evaluated with emphasis on manual interpretation and digital classification. The improved spatial resolution of TM data, as compared with MSS data, aided in the location of roads, small stock ponds, and many other land features, permitting positive identification of landmarks. With the TM, there was more efficient manual interpretation of land use, better identification of resource types, and improved assessment of the ecological status of natural vegetation. Band 5 and band 7 aided in defining water resources, wetland vegetation resources, and other terrain features. Results from TM and TM simulator data suggest that the coefficient of variation for major land cover types is less for TM data than for equivalent MSS data. Although the amount of information in bands 5 and 7 is small, it is unique since the same information cannot be derived from the MSS four-band spectral region. A.R.H.

N84-11555*# Delaware Univ., Newark. Coll. of Marine Studies.
EVALUATION OF SPATIAL, RADIOMETRIC AND SPECTRAL THEMATIC MAPPER PERFORMANCE FOR COASTAL STUDIES Quarterly Status and Technical Progress Report, 1 Jul. - 30 Sep. 1983
V. Klemas, Principal Investigator 30 Sep. 1983 4 p ERTS
(Contract NAS5-27580)
(E84-10018; NASA-CR-174545; NAS 1.26:174545) Avail: NTIS HC A02/MF A01 CSCL 05B

An area along the southeastern shore of the Chesapeake Bay was subsetted from TM imagery. The subsetted image was then enhanced and classified using an ERDAS 400 system. Results obtained were compared with a chart showing the distribution of both Zolsters marina and Rupplia martime in the Vaucluse Shores and which supports a large community of SAV. Radiative transfer models describing the irradiance reflectance of a water column containing SAV are being refined. Radiative transfer theory was used to model upwelling radiance for an orbiting sensor viewing an estuarine environment. Upwelling radiance was calculated for a clear maritime atmosphere, an opticaly shallow estuary of either clear or turbid water, and one of three bottom types: vegetation, sand, or mud using TM bands 1, 2, and 3 and MSS bands 4 and 5. A spectral quality index was defined similar to the equation for apparent contrast and used to evaluate the relative effectiveness of TM and MSS bands in detecting submerged vegetation. A.R.H.

N84-11556*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PASSIVE MICROWAVE SENSING OF SOIL MOISTURE CONTENT: SOIL BULK DENSITY AND SURFACE ROUGHNESS
J. R. Wang May 1982 32 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E84-10019; NASA-TM-83937; SM-G2-04285; NAS 1.15:83937) Avail: NTIS HC A03/MF A01 CSCL 02C

Microwave radiometric measurements over bare fields of different surface roughnesses were made at the frequencies of 1.4 GHz, 5 GHz, and 10.7 GHz to study the frequency dependence as well as the possible time variation of surface roughness. The presence of surface roughness was found to increase the brightness temperature of soils and reduce the slope of regression between brightness temperature and soil moisture content. The frequency dependence of the surface roughness effect was relatively weak when compared with that of the vegetation effect. Radiometric time series observation over a given field indicated that field surface roughness might gradually diminish with time, especially after a rainfall or irrigation. This time variation of surface roughness served to enhance the uncertainty in remote soil moisture estimate by microwave radiometry. Three years of radiometric measurements over a test site revealed a possible inconsistency in the soil bulk density determination, which turned out to be an important factor in the interpretation of radiometric data. Author

N84-11557*# Earth Satellite Corp., Chevy Chase, Md.
CONTRIBUTION OF LANDSAT-4 THEMATIC MAPPER DATA TO GEOLOGIC EXPLORATION
John R. Everett, Jon D. Dykstra, and Charles A. Sheffield [1983] 8 p Sponsored by NASA ERTS
(E84-10021; NASA-CR-174551; NAS 1.26:174551) Avail: NTIS HC A02/MF A01 CSCL 08B

The increased number of carefully selected narrow spectral bands and the increased spatial resolution of thematic mapper data over previously available satellite data contribute greatly to geologic exploration, both by providing spectral information that permits lithologic differentiation and recognition of alteration and spatial information that reveals structure. As vegetation and soil cover increase, the value of spectral components of TM data decreases relative to the value of the spatial component of the data. However, even in vegetated areas, the greater spectral breadth and discrimination of TM data permits improved recognition and mapping of spatial elements of the terrain. As our understanding of the spectral manifestations of the responses of soils and vegetation to unusual chemical environments increases, the value of spectral components of TM data to exploration will greatly improve in covered areas. M.G.

N84-11558*# Minnesota Univ., St. Paul. Space Science Center.

A STUDY OF MINNESOTA LAND AND WATER RESOURCES USING REMOTE SENSING Final Report

31 Dec. 1982 72 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Grant NGL-24-005-263)

(E84-10023; NASA-CR-174547; NAS 1.26:174547) Avail: NTIS HC A04/MF A01 CSCL 08H

A pilot study of 60 lakes in Minnesota shows that LANDSAT data correlate very well with the Carlson trophic state index which is derived from measurements in the field. Nimbus satellite data reveal improvement in water quality in Lake Superior since the dumping of taconite tailings stopped in 1980. A feasibility study of using color infrared photography as a near real time tool for soil and crop management in corn and soybean areas of the state generated strong interest from farmers and agribusiness firms. The state geological survey had success in the use and applications of LANDSAT images. Subtleties of changes in vegetation, soil, and topography are such that ground water presence and depth to water table are nearly always impossible to qualify except for broad scale applications. Bedrock and structural differences as shown in lineaments offer great potential for resolution of some kinds of geologic studies. A synergistic concept is to be used to search for mineral resources in the northeastern part of the state. A.R.H.

N84-11559*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.

ON GRAVITY FROM SST, GEOID FROM SEASAT, AND PLATE AGE AND FRACTURE ZONES IN THE PACIFIC

B. D. Marsh, J. G. Marsh, and R. G. Williamson (EG and G Washington Analytical Services Center, Inc., Riverdale, Md.) [1983] 39 p refs Prepared in cooperation with NASA. Goddard Space Flight Center, Greenbelt, Md. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(E84-10025; NASA-CR-170593; NAS 1.26:170593) Avail: NTIS HC A03/MF A01 CSCL 08G

Data from an additional 50 satellite-to-satellite tracking (SST) passes were combined with earlier measurements of the high degree and order (n, m, > 12) gravity in the central Pacific. A composite map was produced which shows good agreement with conventional GEM models. Data from the SEASAT altimeter was reduced and found to agree well with both the SST and the GEM fields. The maps are dominated especially in the east, by a pattern of roughly east-west anomalies with a transverse wavelength of about 2000 km. Further comparison with regional bathymetric data shows a remarkably close correlation with plate age. Each anomaly band is framed by those major fracture zones having large offsets. The regular spacing of these fractures seems to account for the fabric in the gravity fields. Other anomalies are accounted for by hot spots. The source of part of these anomalies is in the lithosphere itself. The possible plume size and ascent velocity necessary to supply deep mantle material to the upper mantel without complete thermal equilibration is considered. A.R.H.

N84-11560*# Canada Centre for Remote Sensing, Ottawa (Ontario).

CCRS PROPOSAL FOR EVALUATING LANDSAT-D MSS AND TM DATA Progress Report, 2 May - 2 Sep. 1983

W. M. Strome, J. Cihlar, D. G. Goodenough, F. E. Guertin, Principal Investigator, and A. B. Collins 3 Oct. 1983 105 p refs Sponsored by NASA ERTS

(E84-10026; NASA-CR-174549; NAS 1.26:174549; CCRS-5089-3(917)) Avail: NTIS HC A06/MF A01 CSCL 05B

Accomplishments in the evaluation of LANDSAT 4 data are reported. The objectives of the Canadian proposal are: (1) to quantify the LANDSAT-4 sensors and system performance for the purpose of updating the radiometric and geometric correction algorithms for MSS and for developing and evaluating new correction algorithms to be used for TM data processing; (2) to compare and access the degree to which LANDSAT-4 MSS data can be integrated with MSS imagery acquired from earlier LANDSAT missions; and (3) to apply image analysis and information extraction techniques for specific user applications such as forestry or agriculture. M.G.

N84-11561*# California Univ., Berkeley. Remote Sensing Research Program.

ANALYSIS OF THE QUALITY OF IMAGE DATA ACQUIRED BY THE LANDSAT-4 THEMATIC MAPPER AND MULTISPECTRAL SCANNERS Quarterly Status and Technical Progress Report, 1 Jul. - 30 Sep. 1983

Robert N. Colwell, Principal Investigator 11 Oct. 1983 6 p refs ERTS

(Contract NAS5-27377)

(E84-10028; NASA-CR-174550; NAS 1.26:174550; QSTPR-3) Avail: NTIS HC A02/MF A01 CSCL 05B

The geometric quality of the TM and MSS film products were evaluated by making selective photo measurements such as scale, linear and area determinations; and by measuring the coordinates of known features on both the film products and map products and then relating these paired observations using a standard linear least squares regression approach. Quantitative interpretation tests are described which evaluate the quality and utility of the TM film products and various band combinations for detecting and identifying important forest and agricultural features. M.G.

N84-11562*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.

LAND COVER CHANGE MONITORING WITHIN THE EAST CENTRAL LOUISIANA STUDY SITE: A CASE FOR LARGE AREA SURVEYS WITH LANDSAT MULTISPECTRAL SCANNER DATA

G. S. Burns Jun. 1983 36 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Proj. AgRISTARS)

(E84-10031; NASA-TM-85469; DC-Y3-04418; NSTL/ERL-221; NAS 1.15:85469) Avail: NTIS HC A03/MF A01 CSCL 02C

Results established for four digital procedures developed for characterizing the radiometric changes between multidate LANDSAT spectral data sets into meaningful measures of land cover/use dynamics are documented. Each technique's performance was contrasted against digitized land use change maps, which were produced from contemporaneous, retrospective aerophoto coverage, in a cell by cell comparison over a one half by one degree area in east central Louisiana as a standard for comparison. The four techniques identify from 10.5 to 13.0% loss in area of forestland in a five year period; however, they differ more by how accurately this amount of change is distributed, the need for ancillary ground truth, and amount of usable information that is extractable. All require some method of digitally co-registering the two data sets. All are capable of providing tabular statistics as well as map products. Two are capable of detecting changes and identifying their locations. The other two, in addition to this, provide information to qualify land cover conditions at each end of the study interval. Author

N84-11563*# Hampton Inst., Va.

ADSORPTION OF HUMIC ACIDS AND TRACE METALS IN NATURAL WATERS Final Technical Report, 1 Dec. 1980 - 30 Nov. 1982

Wing H. Leung 30 Nov. 1982 57 p refs

(Grant NAG1-122)

(NASA-CR-174481; NAS 1.26:174481) Avail: NTIS HC A04/MF A01 CSCL 08H

Studies concerning the interactions between suspended hydrous iron oxide and dissolved humic acids and trace metals are reported. As a major component of dissolved organic matters and its readiness for adsorption at the solid/water interface, humic acids may play a very important role in the organometallic

geochemistry of suspended sediments and in determining the fate and distribution of trace metals, pesticides and anions in natural water systems. Most of the solid phases in natural waters contain oxides and hydroxides. The most simple promising theory to describe the interactions of hydrous iron oxide interface is the surface complex formation model. In this model, the adsorptions of humic acids on hydrous iron oxide may be interpreted as complex formation of the organic bases (humic acid oxyanions) with surface Fe ions. Measurements on adsorptions were made in both fresh water and seawater. Attempts have been made to fit our data to Langmuir adsorption isotherm. Adsorption equilibrium constants were determined. Author

N84-11564# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPARISON OF SCC MAGNITUDES AT MAGSAT ALTITUDES (325-550 KM) AND AT GROUND LOCATIONS
R. P. Kane Sep. 1983 22 p refs Submitted for publication
(INPE-2890-PRE/409) Avail: NTIS HC A02/MF A01

A comparison of the total SSC magnitudes at MAGSAT altitudes (325 to 550 km) and at ground observatories indicated equality, implying a predominantly magnetospheric origin at dusk and dawn hours. Author

N84-11565# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MAPS OF FAVORABLE AREAS FOR TUNA FISHING IN THE SOUTHWESTERN ATLANTIC PREPARED FROM SATELLITE DATA
Myrian de Moura Abdon Sep. 1983 49 p refs Presented at the 8th Regular Meeting of the Commission ICCAT, Madrid, Nov. 1983
(INPE-2891-PRE/410) Avail: NTIS HC A03/MF A01

Surface temperature intervals suitable for large fish catch of the tuna species: Thunnus albacares, Thunnus alalunga and Thunnus obesus were previously defined for the Southwestern Atlantic. The ranges in temperature were located on thermal infrared images from the SMS-2 satellite and maps of favorable areas for tuna fishing based on these ranges, were prepared for the period February-July, 1980. In the development of these maps, infrared images received from the SMS-2 satellite were automatically processed by computer in the Image-100 System. Comparisons were made between fishing areas and tuna CPUE data for the years 1980, 1981 and 1982. The favorable areas for fishing of the yellowfin tuna were found distributed all over the study area. The favorable areas for fishing of the albacore and the bigeye tuna appeared in the southern part of the study area, mainly in regions where the Malvinas Current occurs. Author

N84-11566# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SPECTRAL BEHAVIOR OF FOUR SOILS FROM THE STATE OF SAO PAULO AT THE ORBITAL, FIELD, AND LABORATORY LEVELS M.S. Thesis [COMPORTAMENTO ESPECTRAL DE QUATRO SOLOS DO ESTADO DE SAO PAULO NOS NIVEIS ORBITAL, DE CAMP E DE LABORATORIO]
Antonio Roberto Formaggio Sep. 1983 141 p refs In PORTUGUESE; ENGLISH SUMMARY
(INPE-2878-TDL/144) Avail: NTIS HC A07/MF A01

Data were collected at the 400 to 1100 nm interval with a spectroradiometer and a hand-held radiometer, respectively. Gray levels were extracted from CCT (Computer Compatible Tape) derived from LANDSÁT-3 MSS through the use of the Multispectral Image Analyzer. The four studied soils presented two types of spectral behavior (type 1, composed by LV and PV and type 2, composed by LR and LE). Type 1 soils were spectrally separable from type 2 soils but not among themselves. The most spectrally affecting factors were the soil surface conditions, iron and organic manner content, and color. The resulting spectral behavior observed at the three levels were in concordance with each other. N.W.

N84-11567# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DIGITAL TRANSMISSION AND VISUALIZATION OF METEOROLOGICAL SATELLITE IMAGES [TRANSMISSAO DIGITAL E VISUALIZACAO DE IMAGENS DE SATELITES METEOROLOGICOS]
Jose Claudio Mura, Juan Carlos Pinto deGarrido, and Paolo Pio Gabriele Camilli Jul. 1983 17 p ref In PORTUGUESE; ENGLISH summary Presented at the 35th Ann. Meeting of SBPC, Belem-Pa., Brazil, 6-13 Jul. 1983
(INPE-2809-PRE/367) Avail: NTIS HC A02/MF A01

The Image Analysis Unit (UAI) is an apparatus that is used to make easy the extraction of information every half an hour from the GOES meteorological satellites imagery received at Instituto de Pesquisas Espaciais (INPE). These images can simply be shown in a video monitor and/or enhanced and animated according to the needs. To enable external users to access INPE's resources in real time, it has developed a system of transmission through a normal telephone line that allows the acquisition of the images in a Remote Unit (UAI-R). These images can be stored in the 1 Mybte memory of the Remote Unit whose capacity is of 4 images. The transmission and reception system is controlled by an 8085 microprocessor. Some applications in the areas of meteorology, hydrology and oceanography are mentioned. Author

N84-11568# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ATMOSPHERIC CORRECTION STUDIES/PROCESSING IMAGE NO. I-100 Final Report [ESTUDOS DE CORRECAO ATMOSFEICA/PROCESSAMENTO DE IMAGEM NO I-100]
Celia Lucia Yao Sep. 1983 85 p refs In PORTUGESE; ENGLISH summary
(INPE-2870-RPE/442) Avail: NTIS HC A04/MF A01

An atmospheric correction program optimization and its implementation in the B-6800 and I-100 (PDP 11/45) (INPE) is presented. In order to perform the atmospheric correction, a mathematical algorithm was applied to the apparent radiance to bring it the closest possible to the target intrinsic radiance. The resulting correction is shown on the I-100 screen. If the user knows the gray level image matrix it is also possible to correct it without the I-100, then even if the screen is been used for other tasks, it is possible to correct the matrix, simultaneously. S.L.

N84-11569*# Resource Consultants, Inc., Fort Collins, Colo.
SNOWPACK GROUND-TRUTH MANUAL Final Report
E. B. Jones May 1983 107 p refs
(Contract NAS5-26802)
(NASA-CR-170584; NAS 1.26:170584) Avail: NTIS HC A06/MF A01 CSCL 08L

As remote sensing increasingly becomes more of an operational tool in the field of snow management and snow hydrology, there is need for some degree of standardization of "snowpack ground truth" techniques. This manual provides a first step in standardizing these procedures and was prepared to meet the needs of remote sensing researchers in planning missions requiring ground truth as well as those providing the ground truth. Focus is on ground truth for remote sensors primarily operating in the microwave portion of the electromagnetic spectrum; nevertheless, the manual should be of value to other types of sensor programs. This first edition of ground truth procedures must be updated as new or modified techniques are developed. Author

N84-11570# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Science and Technology Lab.
ASSESSMENT OF POTENTIAL SSM/I (SPECIAL SENSOR MICROWAVE/IMAGER) ICE PRODUCTS IN LIGHT ESMR (ELECTRICALLY SCANNING MICROWAVE RADIOMETER) AND SMMR (SCANNING MICROWAVE SPECTROMETER) ICE CLASSIFICATION ALGORITHMS Final Report
Duane T. Eppler Jun. 1983 35 p refs
(AD-A130961; NORDA-TN-220) Avail: NTIS HC A03/MF A01 CSCL 08/12

The Special Sensors Microwave/Imager (SSM/I) will be

launched aboard a DMSP satellite in FY-85. Spatial resolution of the high frequency 85.5 GHz channel is substantially better than the highest resolution obtained from ESMR and SMMR sensors (approximately 30 km), Data received from this channel will improve the accuracy with which ice edges and bodies of open water within the pack can be located. The cell size for which total ice concentration can be estimated also will be reduced. However, estimates of multi-year ice concentration, of thin ice types, and the character of ice in the marginal ice zone will not be improved over SMMR estimates by virtue of these higher frequency data. Enhanced estimates of these parameters must come from development of improved ice classification algorithms. Improved ground truth information from which satellite data can be interpreted and verified is critical if classification algorithms are to be improved. Specifically, data that document radiometric signatures of wet and snow-covered ice surfaces that occur during summer and autumn months are needed to improve estimates of multi-year concentrations during melt and freeze-up. Brightness temperature data that describe the transition from open water to thick first-year ice are required for improved discrimination of thin ice types. Ground truth data that correlate marginal ice zone conditions with low-resolution imagery from satellite-borne microwave sensors are needed to improve estimates of conditions with the marginal ice zone. GRA

N84-11571# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

DETERMINING ATTITUDE OF OBJECT FROM NEEDLE MAP USING EXTENDED GAUSSIAN IMAGE

Katsushi Ikeuchi Apr. 1983 28 p refs

(Contracts N00014-77-C-0389; N00014-80-C-0505)

(AD-A131617; AI-M-714) Avail: NTIS HC A03/MF A01 CSCL 09/2

An extended Gaussian image (EGI) is constructed by mapping the surface normals of an object onto the Gaussian sphere. The attitude of an object is greatly constrained by the global distribution of EGI mass over the visible Gaussian hemisphere. Constraints on the viewer direction are derived from the position of the EGI mass center, and from the direction of the EGI inertia axis. The algorithm embodying these constraints and the EGI mass distribution are implemented using a lookup table. A function for matching an observed EGI with the prototypical EGIs is also proposed. The algorithm determines the attitude of an object successfully both from a synthesized needle map and a real needle map.

Author (GRA)

N84-11572# SRI International Corp., Menlo Park, Calif.

COMPUTER VISION RESEARCH AND ITS APPLICATIONS TO AUTOMATED CARTOGRAPHY Semiannual Technical Report, 10 Dec. 1982 - 10 Jun. 1983

Martin A. Fischler 27 Jul. 1983 44 p refs

(Contract MDA903-83-C-0027)

(AD-A131289; SATR-1) Avail: NTIS HC A03/MF A01 CSCL 08/2

The principal objective in this research program is to obtain solutions to fundamental problems in computer vision; particularly those problems that are relevant to the development of an automated capability for interpreting aerial imagery and the production of cartographic products. Our plan is to advance the state of the art in selected core areas such as stereo compilation, feature extraction, linear delineation, and image matching; also to develop an expert system control structure which will allow a human operator to communicate with the computer at a problem oriented level, and guide the behavior of the low level interpretation algorithms doing detailed image analysis. Finally, we plan to use the DARPA/DMA Testbed as mechanism for transporting both our own and IU community advances, in image interpretation and scene analysis, to DMA, ETL, and other members of the user community. GRA

N84-11573# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.

HYDROGRAPHIC SURVEY REQUIREMENTS SYSTEM (HYSUR) Final Report

Chung Hye Read Jun. 1983 9 p

(AD-A131115) Avail: NTIS HC A02/MF A01 CSCL 08/2

The Defense Mapping Agency (DMA) has no automated system with which tofdetermine the survey precedence of the 8.2 million square nautical miles of worldwide coastal areas which require hydrographic surveying. In response to this vast requirement, the DMA Hydrographic/Topographic Center(HTC) is developing the Hydrographic Survey Requirements System (HYSUR). This software system will enable managers to make timely, systematic decisions, thereby enhancing the utility of the Naval Oceanographic Office (NAVOCEANO) survey vessels. This report discusses the practical applications of this system which will identify hydrographic data deficiency areas; establish a rank order for required survey areas considering economic, political, military, and physical factors; provide an alternative planning capability to answer management-level questions; and produce survey program plans based on the results of the ranking procedures, available resources, and estimated cost. Author (GRA)

N84-11574# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.

AFRICAN DOPPLER SURVEYS (ADOS)

Muneendra Kumar Jun. 1983 73 p Presented at the 18th General Assembly of the IUGG, Hamburg, 15-27 Aug. 1983

(AD-A131135) Avail: NTIS HC A04/MF A01 CSCL 08/2

This report outlines a brief summary of the work, as of 15 June 1983, performed by the Defense Mapping Agency (DMA) under the African Doppler Survey (ADOS) project. In order to utilize the many Doppler surveys already completed (prior to ADOS) in Africa, a detailed search of the DMA's data bank was carried out during January-March 1983. The existing data, which showed promise of meeting the ADOS technical specification, were carefully sorted out, processed, computed and released to other ADOS Computing Centers. Author (GRA)

N84-11575# San Diego State Univ., Calif. Dept. of Geological Sciences.

TERRAIN EFFECTS IN RESISTIVITY AND MAGNETOTELLURIC SURVEYS Ph.D. Thesis

George R. Jiracek and H. Truman Holcombe (Geotechnical Exploration, Inc., San Diego, Calif.) Dec. 1982 189 p refs

(Contract DE-FC07-79ID-12038)

(DE83-014084; DOE/ID-12038/T1) Avail: NTIS HC A09/MF A01

A three-dimensional finite element computer algorithm which can accommodate arbitrarily complex topography and subsurface structure, has been developed to model the resistivity response of the Earth. The algorithms has undergone extensive evaluation and is believed to provide accurate results for realistic earth models. Testing included comparison to scale model measurements, analytically calculated solutions, and results calculated numerically by other independent means. Computer modeling experiments have demonstrated that it is possible to remove the effect of topography on resistivity data under conditions where such effects dominate the response. This can be done without resorting to lengthy and costly trial and error computer modeling. After correction, the data can be interpreted with confidence that the anomalies are due only to subsurface structure. The results of case studies on resistivity field data measured in high relief topography are discussed. DOE

N84-11576# North Carolina Dept. of Natural Resources and Community Development, Raleigh. Geological Survey Section.

GEOLOGIC MAP AND MINERAL RESOURCES SUMMARY OF THE FARNER QUADRANGLE, TENNESSEE AND NORTH CAROLINA

Carl F. Merschat and Robin C. Hale 1983 29 p refs

(DE83-902886; USGS-3902886) Avail: NTIS HC A03/MF A01

This summary accompanies the geologic map of the Farner guadrangle, Tennessee - North Carolina, which is bounded by 35007'30" and 35015'N. Latitude and by 84015' and 83022" W. Longitude. The mineral commodities that have been extracted

include gold, stone, and residual gravel. Currently, there is no active mining, although recreational and commercial placer gold mining may occur intermittently. In addition, proximity of this area to the Ducktown Mining District provides the impetus for occasional exploration programs for copper-bearing massive sulfide deposits. DOE

N84-11577# California Univ., Berkeley. Remote Sensing Research Program.
ESTIMATING TEMPERATURE AND MOISTURE REGIMES IN FOREST AND RANGELAND SOILS USING THERMAL REMOTE SENSING Final Report, Oct. 1981 - Jun. 1983
S. D. DeGloria and R. N. Colwell Jun. 1983 118 p
(Contract USDA-FS-53-3187-2-29)
(PB83-237453; NFAP-325) Avail: NTIS HC A06/MF A01 CSCL 02F

This research task seeks to investigate the usefulness of shortwave and longwave spectral Thematic Mapper Simulator (TMS) data and additional environmental site variables for stratifying forest landstypes into specific soil temperature regimes and for mapping sites suitable for reforestation programs. GRA

N84-11530# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
INTERDISCIPLINARY ASPECTS OF TECHNICAL MEASUREMENTS [INTERDISZIPLINAERE ASPEKTE BEI TECHNISCHEN MESSUNGEN]
L. Hallermann *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 9-18 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11532# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
VARIATIONS OF OCEAN SURFACES FROM ERS-1 ALTIMETER DATA FOR REPETITIVE ORBITS [AENDERUNGEN DER OZEANOBERFLAECHE AUS DEN ERS-1 ALTIMETERDATEN FUER REPETITIVE]
K. R. Koch and D. Fritsch *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 33-38 refs In GERMAN; ENGLISH summary (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11533# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
NEW OPPORTUNITIES FOR OLD MEASURING METHODS BY USING AUTOMATIC SECONDS THEODOLITES (AST) [NEUE CHANCEN FUER ALTE MESSMETHODEN DURCH DEN EINSATZ VON AUTOMATISCHEN SEKUNDENTHEODOLITEN]
H.-J. Larisch and M. Scherer *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 39-60 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11534# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
DETERMINATION OF A GEOID PROFILE ACROSS THE ALPS USING DOPPLER MEASUREMENTS OF THE US NAVY NAVIGATION SATELLITE SYSTEM (NNSS) [UEBER DIE BESTIMMUNG EINES GEOIDPROFILS DURCH DIE ALPEN MIT HILFE VON DOPPLERMESSUNGEN IM NNSS]
Franz Josef Lohmar, Claudio Marchesini (Trieste Univ., Italy), and Hermann Seeger *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 61-80 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

N84-11536# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
FIRST EXPERIENCES WITH THE MARK 3 VERY LONG BASELINE INTERFEROMETRY (VLBI) DATA ANALYSIS SYSTEM [ERSTE ERFAHRUNGEN MIT DEM MARK 3-VLBI-DATEN-AUSWERTESYSTEM]
H. Schuh *In its* Studies on Satellite Studies, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 109-129 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N84-11578* National Aeronautics and Space Administration, Washington, D. C.
ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 38
Jul. 1983 348 p
(NASA-SP-7043(38); NAS 1.21:7043(38)) Avail: NTIS HC $15.00 CSCL 10A

This bibliography lists 1367 reports, articles and other documents introduced into the NASA scientific and technical information system from April 1, 1983 through June 30, 1983. A.R.H.

N84-11579*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA REDOX STORAGE SYSTEM DEVELOPMENT PROJECT, CALENDAR YEAR 1982 Annual Report
Oct. 1983 28 p refs
(Contract DE-AI04-80AL-12726)
(NASA-TM-83469; E-1784; NAS 1.15:83469;
DOE/NASA/12726-23) Avail: NTIS HC A03/MF A01 CSCL 10C

Development was continued for iron-chromium battery operation at 65 C. Membranes that were adequate at 25 C were shown to be unacceptable at 65 C with regard to selectivity. This led to the elevated-temperature, mixed-reactant mode of operation, in which each reactant solution, when discharged, contains both ferrous and chromic chlorides. This operating mode allows the use of very low-resistivity membranes, resulting in high energy efficiencies at current densities. It also allows the use of very simple techniques to correct for solvent or reactant transfer through cell membranes. Screening of candidate catalysts for the chromium electrode led to the development of a bismuth-lead candidate having several attractive characteristics. Author

N84-11580*# Allied Chemical Corp., Solvay, N. Y. Syracuse Research Lab.
STUDY TO ESTABLISH COST PROJECTIONS FOR PRODUCTION OF REDOX CHEMICALS Final Report
J. F. Walther, C. C. Greco, R. N. Rusinko, and A. L. Wadsworth, III Nov. 1982 36 p refs
(Contracts DEN3-250; DE-AI04-80AL-12726)
(NASA-CR-167881; DOE/NASA/0250-1; NAS 1.26:167881) Avail: NTIS HC A03/MF A01 CSCL 10B

A cost study of four proposed manufacturing processes for redox chemicals for the NASA REDOX Energy Storage System yielded favorable selling prices in the range $0.99 to $1.91/kg of chromic chloride, anhydrous basis, including ferrous chloride. The prices corresponded to specific energy storage costs from under $9 to $17/kWh. A refined and expanded cost analysis of the most favored process yielded a price estimate corresponding to a storage cost of $11/kWh. The findings supported the potential economic viability of the NASA REDOX system. Author

N84-11581*# Engelhard Industries, Inc., Edison, N.J.
DEVELOP AND TEST FUEL CELL POWERED ON-SITE INTEGRATED TOTAL ENERGY SYSTEM Quarterly Report, Aug. -

Oct. 1982
7 Sep. 1983 23 p
(Contracts DEN3-241; DE-AI01-80ET-17088)
(NASA-CR-168159; DOE/NASA/0241-7; NAS 1.26:168159; QR-7)
Avail: NTIS HC A02/MF A01 CSCL 10C

Test results are given for a 5 kW stack and initial results for an integrated, grid connected system operating from methanol fuel. Site selection criteria are presented for future demonstration of a 50 or 100 kW OS/IES. Preliminary results are also given with approximate internal rates of return to the building owner. Progress in development and construction of a 50 kW modular methanol/steam reformer is reported. Author

N84-11582# Tennessee Univ., Knoxville. Dept. of Chemistry.
EVALUATION OF LOW MELTING HALIDE SYSTEMS FOR BATTERY APPLICATIONS Final Report, Sep. 1978 - Feb. 1983
Gleb Mamantov and Cedomir Petrovic Wright-Patterson AFB, Ohio AFWAL Apr. 1983 169 p refs
(Contract F33615-78-C-2075; AF Proj. 3145)
(AD-A131330; AFWAL-TR-83-2032) Avail: NTIS HC A08/MF A01 CSCL 10/3

This program involved evaluation of selected low temperature molten salt solvent systems containing inorganic and/or organic chlorides and bromides for battery applications. The research involved determination of the liquids temperatures, the specific electrical conductivity, and the electrochemical span of selected halide systems. The studies of a few cathode and anode systems and of two prototype cells were also undertaken for a few promising solvent systems. GRA

N84-11583# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CLOSED ENERGY CYCLE WITH MRD GENERATOR USING T-LAYER EFFECT
V. S. Slavin and V. S. Sokolov 30 Jun. 1983 13 p refs Transl. into ENGLISH from Izv. Sib. Otd. Akad Nauk SSSR (USSR), v. 13, no. 3, 1972 p 82-87
(AD-A131136; FTD-ID(RS)T-0380-83) Avail: NTIS HC A02/MF A01 CSCL 10/2

The theoretical possibility of using a magnetohydrodynamic generator with a T layer in closed energy cycles is examined. The presence of the T layer in the gas stream assures that the flow will interact quite effectively with the magnetic field, which in turn allows the possibility of creating an induction magnetohydrodynamic generator to be calculated. However, in view of the fact that the thermodynamic nature of the process within the generator is independent of the type of magnetohydrodynamic generator, no distinction between conduction and induction systems is made. As a working fluid, an inert gas with an alkali metal additive is examined. GRA

N84-11584# Midwest Research Inst., Golden, Colo. Renewable Resource Assessment and Instrumentation Branch.
ACOUSTICAL MEASUREMENTS OF DOE/NASA MOD-0 WIND TURBINE AT PLUM BROOK STATION, OHIO
C. L. Etter, N. D. Kelley, H. E. McKenna, C. Linn, and R. Garrelts Jun. 1983 30 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-011971; SERI/TR-635-1240) Avail: NTIS HC A03/MF A01

This report documents the evaluation of low-frequency acoustic emissions associated with the operation of the DOE/NASA MOD-0 wind turbine generator located at Plum Brook Station, Ohio. These measurements were taken as part of a joint SERI/NASA Brook Station, Ohio. These measurements were taken as part of a joint SERI/NASA effort to study acoustic noise generation by utility-sized wind turbines. The machine-operating conditions closely simulated the operation of the larger DOE/NASA MOD-1 wind turbine installed near Boone, NC, in both its design downwind configuration and theoretical upwind mode. Measurement results indicated that acoustic impulses characteristic of the MOD-1 turbine were detectable only with a downwind configuration and a 35-rpm rotor speed, a situation which parallels a 23-rpm rotor speed operation on the MOD-1. Under the available meteorological conditions, no impulses were detected during downwind 23 rpm or by wind-induced noise, indicating a severe limitation of the microphone configuration used in these tests. DOE

N84-11585# Midwest Research Inst., Golden, Colo. Materials Research Branch.
MATRIX APPROACH FOR TESTING MIRRORS, PART 1
Keith D. Masterson and M. Lind Apr. 1983 35 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-009398; SERI/TR-255-1504) Avail: NTIS HC A03/MF A01

The purpose of this report is to describe the development of a matrix approach for testing mirrors (MATM) systematically subjects mirrors to accelerated and abbreviated exposures to significant environmental conditions encountered in solar applications (such as water vapor, pollutants, elevated temperature, temperature cycles, and ultraviolet light) that can lead to corrosion and reduced specular reflectance. The objective of the first phase of this project was to collect baseline data on degradation rates for exposure of a number of types of mirrors to temperatures and water vapor. Techniques for characterizing mirror corrosion were also surveyed (such as reflectance, light scattering, optical microscopy, and surface analysis). The results of the first phase of the MATM validate the basic experimental approach selected. The results also validate eliminating temperature cycling from the second phase of the project and reducing the number of optical characterization measurements to the spectral, hemispherical, and diffuse reflectance; image analysis; and light scattering at 400 nm. DOE

N84-11586# Sandia Labs., Albuquerque, N. Mex.
MEMBRANES AND SEPARATORS FOR FLOWING-ELECTROLYTE BATTERIES: A REVIEW
C. Arnold, Jr. and R. A. Assink 1983 28 p refs Presented at Natl. Meeting of the Am. Inst. of Chem. Engr., Denver, Colo., 28 Aug. 1983
(Contract DE-AC04-76DP-00789)
(DE83-016246; SAND-83-1655A; CONF-830859-3) Avail: NTIS HC A03/MF A01

Membranes and separators for flowing electrolyte batteries are reviewed. Simple descriptive models are used to illustrate their functions and to distinguish between the operation of separators and membranes. Several studies which investigated the relationships between membrane structure and properties are reviewed. The many methods of separator and membrane preparation are compared. Finally, the specific separator and membrane requirements of three flowing electrolyte battery systems currently under development are described. Emphasis is placed on the mechanism of membrane fouling in iron/chromium redox battery, oxidative degradation of the membrane in the zinc/ferricyanide battery and separator impurities in the zinc/bromine battery. DOE

N84-11587# Sandia Labs., Albuquerque, N. Mex. Photovoltaic Concentrator Research Div.
TENTH PHOTOVOLTAIC CONCENTRATOR PROJECT INTEGRATION MEETING
Eldon Boes Apr. 1983 277 p refs Meeting held in Albuquerque, N.Mex., 6 Apr. 1983
(Contract DE-AC04-76DP-00789)
(DE83-012338; SAND-83-0604; CONF-830477) Avail: NTIS HC A13/MF A01

Research on photovoltaic concentrators and their components, including concentrator cells, cell assemblies and receivers, fresnel lenses, concentrator modules, tracking structures and control systems, and complete concentrator arrays is presented. Abstracts and summaries of presentation are included. DOE

N84-11588# Metallgesellschaft, A.G., Frankfurt am Main (West Germany).
HEAT PIPES MADE OF ROLL BOND PANELS Final Report, Jun. 1981

Manfred Moeller and Karl Heil Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-116; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,10

The use of large surfaced aluminum roll bond panels with an integral flow system as heat pipes is studied. With a suitable flow system e.g., parallel passages with a cross-connection, one single filling procedure is required for the operating medium. Adequate materials for the manufacture of heat pipes are Al 99,3; AlMn1, 5 and AlMn1, 5Sil,5. Peel, creep and burst tests as well as corrosion tests were made on specimens and structural elements of these materials. Results show that the use of such panels for heat pipe manufacturing is appropriate for limited maximum temperature applications. Prototypes of heat pipes and their characteristic features are described in view of their use as absorbers in solar collectors. Good heat exchange performances obtained. Author (ESA)

N84-11589# GKSS-Forschungszentrum Geesthacht (West Germany).
WINDPOWERED GENERATORS. TEST FIELD PELLWORM. THE TEST OF THE AEROMAN SYSTEM Final Report [WINDKRAFTANLAGEN-VERSUCHSFELD PELLWORM]
S. Fries, J. Bruegmann, G. Petersen, and H.-T. Mengelkamp 1983 45 p refs In GERMAN; ENGLISH summary
(GKSS-83-E-15; ISSN-0344-9629) Avail: NTIS HC A03/MF A01

The wind energy converter Aeroman was tested for 2 yr. A characteristic power curve is determined. By means of this curve the annual energy production for a site with a known annual mean wind speed can be calculated. Author (ESA)

N84-11590# Siemens A.G., Munich (West Germany). Forschungslab.
AMORPHOUS SILICON SOLAR CELLS Final Report, Mar. 1981
Wilfried Juergens, Wolfgang Kruehler, Matthias Moeller, Hans Pfleiderer, Rolf Plaettner, Bernhard Rauscher, and Walter Stetter Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 192 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-112; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany, DM 35,50

A technique for manufacturing amorphous silicon solar cells is described. Hydrogenated amorphous silicon (a-Si:H) with excellent photoconductivity (ratio of photo and dark conductivity = 10,000 for 0,25 mW/sqcm light intensity) photoluminescence, and low density of states was manufactured. Doping behavior in a-Si:H-films and dependence of geometrical cell structure on electrical properties were investigated. A-Si:H-Schottky barrier cells with Pt, Pd, Au and Ni as Schottky-contacts and pin/indium-tin-oxide cells were manufactured and investigated. With pin structure a conversion efficiency of 6,7% was achieved (Ante meridien (AM1) illumination, 6 sqmm active area). For larger solar cells (2,75 sqcm) efficiencies up to 5,9% were reached. Open circuit voltage, short circuit current and fill factor are 860 mV, 14,7 mA/sqcm and 64% respectively. Fluorinated and chlorinated a-Si:H and microcrystalline Si-material were investigated, and theoretical models are developed to explain the stationary and temporal photoluminescence and the behavior of the pin-cells. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N84-11591 Utah Univ., Salt Lake City.
THREE-DIMENSIONAL MODEL FOR WIND FLOW AND POLLUTANT TRANSPORT-DIFFUSION OVER COMPLEX TERRAIN Ph.D. Thesis
Wen-Shung Kau 1982 206 p
Avail: Univ. Microfilms Order No. DA8306226

From statistical studies of dynamic relationships between the geostrophic level wind velocity and potential temperature, vertical heat flux, surface wind and surface potential temperature, statistical dynamic models were constructed for prediction of the surface wind and the surface potential temperature at the observation stations. Then based on (1) these statistically predicted values of surface wind and surface potential temperature; (2) an equation relating the wind velocity in the Ekman boundary layer and the drainage velocity expressed by Prandtl's analytic solution of slope wind; (3) the surface energy budget equation including radiation terms, sensible heat flux, latent heat flux, and surface storage; and (4) the Businger-Dyer surface layer formulations, values of Monin-Cbukhov length, ground potential temperature, and drainage wind at the observation stations can be obtained.
Dissert. Abstr.

N84-11592 State Univ. of New York, Albany.
SOLAR RADIATIVE IMPACTS OF GRAPHITIC CARBON (SOOT) IN AEROSOLS, CLOUDS AND SNOW Ph.D. Thesis
Venkatachalam Ramaswamy 1982 166 p
Avail: Univ. Microfilms Order No. DA8306207

The interaction of solar radiation with graphitic carbon (soot) particles is analyzed using a random internal mixture model. In this model, submicron soot particles resulting from natural and anthropogenic sources are distributed inhomogeneously inside aerosols, cloud drops and snow grains. The optical properties of such composite media are evaluated using the Chylek-Srivastava mixing rule that accounts for conducting particles embedded in a dielectric matrix. The radiative properties are determined using the two stream and the delta Eddington approximations. The fundamental result is the sensitivity of the optical properties to the volume and size distribution of soot particles. A soot content of 0.1% is sufficient to cause an increase in the imaginary part of refractive index of a sulfate aerosol by 4 orders of magnitude at a wavelength of 0.5 micron. Dissert. Abstr.

N84-11593*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC EXHAUST EFFLUENT DIFFUSION PREDICTIONS AND MEASUREMENTS FOR STS-1, STS-2, STS-3, AND STS-4
Robert E. Turner, comp. Sep. 1983 113 p refs
(NASA-TM-82551; NAS 1.15:82551) Avail: NTIS HC A06/MF A01 CSCL 13B

The results of air quality predictions and measurements made during the launches of the Space Shuttle are presented. The atmospheric conditions, the use of the REED code, and the resulting predictions and measurements are discussed. S.L.

N84-11594*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BACTERIAL DEGRADATION OF POLYCHLORINTED BIPHENYLS IN SLUDGE FROM AN INDUSTRIAL SEWER LAGOON
Walter S. Kim, Adrienne M. Takacs (Case Western Reserve Univ.), and David E. Kuivinen 1983 13 p Presented at the PCB Seminar, Atlanta, 6-8 Dec. 1983; sponsored by EPRI
(NASA-TM-83543; E-1915; NAS 1.15:83543) Avail: NTIS HC A02/MF A01 CSCL 13B

A laboratory experiment was conducted to determine if polychlorinated biphenyls (PCB's) found in an industrial sewer sludge can be effectively degraded by mutant bacteria. The aerated sludge was inoculated daily with mutant bacteria in order to augment the existing bacteria with bacteria that were considered to be capable of degrading PCB's. The pH, nitrogen, and phosphorus levels were monitored daily to maintain an optimum growing medium for the bacteria. A gas chromatographic method was used to determine the PCB concentrations of the sludge initially and also throughout the experiment. Results and discussion

of the bacterial treatment of polychlorinated biphenyls are presented. Author

N84-11595*# Martin Marietta Corp., Denver, Colo.
EVALUATION AND PREDICTION OF LONG-TERM ENVIRONMENTAL EFFECTS OF NONMETALLIC MATERIALS, SECOND PHASE Final Report
Sep. 1983 46 p refs
(Contract NAS8-33578)
(NASA-CR-170915; NAS 1.26:170915; MCR-83-643) Avail: NTIS HC A03/MF A01 CSCL 13B

Changes in the functional properties of a number of nonmetallic materials were evaluated experimentally as a function of simulated space environments and to use such data to develop models for accelerated test methods useful for predicting such behavioral changes. The effects of changed particle irradiations on candidate space materials are evaluated. N.W.

N84-11596# Brookhaven National Lab., Upton, N. Y.
A STUDY OF AIR-POLLUTION MIXING HEIGHTS AND ATMOSPHERIC TURBULENCE OVER NEW YORK CITY, DATA REPORT
S. SethuRaman, C. Henderson, T. Volk (NYU), and M. I. Hoffert (NYU) Aug. 1983 33 p
(Contract DE-AC02-76CH-00016)
(DE83-010624; BNL-51625) Avail: NTIS HC A03/MF A01

A major factor that affects the variation of ground level concentration of air pollutants such as particulates, sulfur oxide, nitrogen oxides, carbon monoxide, hydrocarbons, and photochemical oxidants is the mixing height in the earth's atmosphere close to the surface. This is the layer within which processes associated with the atmospheric turbulence generated by the surface roughness and heating dominate. In order to investigate the variation of this mixing height and associated turbulence over New York City, an experiment was performed over the Barney building of New York University located in lower Manhattan. The mixing height was measured continuously with an acoustic sounder for 10 days from the roof of the Barney building estimated to be 50m above the street level. Several meteorological instruments were used on a 16m tower located on the roof of this building to study other atmospheric variables in the mixed layer. A description is given of the instruments and the data acquisition system used in the experiment. DOE

N84-11597# Bermuda Biological Station for Research, Inc., Ferry Reach.
TRANSPORT AND FATE OF ACID RAINS OUT OF NORTH AMERICA Final Report, 14 Apr. 1982 - 13 Apr. 1983
A. H. Knap Jun. 1983 45 p refs
(Contract DE-AC02-82ER-60045)
(DE83-015819; DOE/ER-60045/T1) Avail: NTIS HC A03/MF A01

The transport of acid rain was studied. The results indicate that precipitation at Bermuda is acidified to a pH of 4.8 over a one-year period with a seasonal component of greater acidity (pH 4.4) corresponding to back trajectories of the North American air mass. The composition of Bermuda rainwater compared to a North American coastal site was determined as well as a shipboard collection program between eastern North America and Bermuda. The results indicate that the strong acid acidity is due to long range transport of the North American air mass. DOE

N84-11598# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Computer Science and Mathematics.
THE GEOGRAPHIC AND STATISTICAL ANALYSIS OF AIR QUALITY DATA IN THE UNITED STATES Ph.D. Thesis
Laura Derelle Johnson 3 Jun. 1983 176 p refs
(Contract DE-AC03-76SF-00098)
(DE83-016471; LBL-16214) Avail: NTIS HC A09/MF A01

This dissertation contains the development and the application of analytic procedures for examining and exploring some air-quality data collected by the Environmental Protection Agency from 1974 through 1976. They are collected at monitoring stations most of which are in metropolitan areas. These data are irregularly distributed discrete-point measurements. The techniques explored here may be useful in other disciplines with the same type of data. The analysis concentrates on suspended particulates and sulfur dioxide because of data availability and the current interest to the health field. Ohio is chosen as an example because it is the most thoroughly monitored state in the US. Interpolation schemes are explored and a two-dimensional analogue of the moving average model in time series is presented. Comparison to Akima's method of bivariate linear interpolation is made. Also, contour maps using each method are drawn and compared. Advantages and disadvantages for comparing cross-validation estimates are discussed. How different goals may prescribe different estimation techniques is discussed. DOE

N84-11599# Brookhaven National Lab., Upton, N. Y. Environmental Chemistry Div.
THE DEVELOPMENT AND IMPLEMENTATION OF TECHNIQUES TO DETERMINE THE CONCENTRATIONS OF ENVIRONMENTAL POLLUTANTS ARISING FROM ENERGY PRODUCTION Annual Report for 1982
L. Newman Jan. 1983 137 p refs
(Contract DE-AC02-76CH-00016)
(DE83-015386; BNL-32940) Avail: NTIS HC A07/MF A01

Techniques were developed to determine the concentration of environmental pollutants arising from energy production and interactions among them. Activities include development of measurement methodology, theoretical, and laboratory studies of the reactions and properties of these substances, and field experiments. Emphasis was placed on developing highly sensitive techniques for measuring gaseous pollutants, developing methods for determining the size distribution and molecular composition of ambient aerosols, theoretical studies and laboratory measurements of aerosol properties, modeling the chemical reactions of pollutants, laboratory studies of the mechanisms and rates of fundamental reactions, etc. DOE

N84-11600# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
EDDY-CORRELATION MEASUREMENTS OF THE RESISTANCE TO VERTICAL TRANSPORT OF OZONE Ph.D. Thesis
John August Eastman 1983 304 p refs
(Contract W-31-109-eng-38)
(DE83-015363; DOE/NBM-301363) Avail: NTIS HC A14/MF A01

The major objective was to measure the resistance to ozone uptake over a variety of surfaces and under a variety of conditions. These resistance data along with new data on reaction-rate coefficients and the concentration of trace species can be incorporated into increasingly sophisticated models to provide a better understanding of the tropospheric ozone budget. Measurements made over a grass field showed a gradual decrease in the total resistance over an eight-week period in the spring. The data collected under overcast skies and before the grass had begun to turn green, was indicative of ozone destruction by nontranspiring surface material. The average resistance for the eight-week period was 2.3 s/cm. Eddy correlation measurements made over a mature maize crop showed a strong diurnal trend with minimum resistance occurring at midday. The average total resistance, 2.3 s/cm, was nearly the same as that measured over grass; however, the flux was about twice as large as that measured over grass since ozone concentrations were two times higher. Data collected over soybeans showed that the effective bulk-surface resistance was highly correlated to the canopy resistance to water-vapor transport, indicating the important role stomata play in controlling ozone uptake. DOE

N84-11601# Brookhaven National Lab., Upton, N. Y. Atmospheric Sciences Div.
PROCEEDINGS OF THE WORKSHOP ON COASTAL ATMOSPHERIC TRANSPORT PROCESSES
S. SethuRaman 1982 48 p refs Workshop held in Upton, N.Y., 13-15 Jul. 1982

(Contract DE-AC02-76CH-00016)
(DE83-015489; BNL-51666; CONF-820792-Summ.) Avail: NTIS HC A03/MF A01

The needs of agencies and organizations for information on coastal processes are outlined. Atmospheric mesoscale processes, data base acquisiton and analysis, and marine mesoscale processes are discussed. It was recommended that those concerned with meeting current and future operational needs in the coastal zones should recognize the necessity of developing more accurate capabilities for measuring, understanding, and modeling the complex meteorological processes. Specific items recommended include the establishment of a Coastal Data Archive with a compilation of existing data sets and the establishment of a study in geographically different coastal areas to generate comprehensive data sets required for parameterization of important processes. Modeling efforts should evaluate and compare existing coastal transport and diffusion models, define and update current regulatory models and continue development of user-oriented air quality models, operational mesoscale wind, wave and fog forecasting models, parameterization models for the planetary and internal boundary layers, dispersion and photochemical models, a wave-current coastal hydrodynamic model and research-oriented three-dimensional dynamic models for the coastal region. DOE

N84-11602# Oak Ridge Associated Universities, Tenn. Inst. for Energy Analysis.
INTERNATIONAL CARBON DIOXIDE-RELATED ACTIVITIES: THE INTERNATIONAL ORGANIZATIONS INVOLVED AND US BILATERAL ARRANGEMENTS
Rayola Dougher Jul. 1983 42 p
(Contract DE-AC05-76OR-00033)
(DE83-016013; DOE/NBB-0039) Avail: NTIS HC A03/MF A01

The issue of increasing carbon dioxide in the atmosphere, its measurement and possible impact is discussed. International organizations and the type of CO2-related activities they conduct are described. The CO2 research work conducted through US bilateral arrangements is outlined. The major international organizations that engage in CO2-related research are the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP), the International Council of Scientific Unions (ICSU), the Scientific Committee on Problems of the Environment (SCOPE), the European Community, the International Energy Agency (IEA), the International Institute for Applied Systems Analysis (IIASA), and the International Atomic Energy Agency (IAEA). DOE

N84-11603# Illinois Univ., Urbana. Inst. for Environmental Studies.
THE APPLICATION OF MULTIVARIATE SOURCE/RECEPTOR MODELS TO AEROSOL MASS APPORTIONMENT
Philip K. Hopke 1983 8 p refs Presented at the 6th World Congr. on Air Quality, Paris, 16 May 1983
(Contract DE-AC02-80EV-10403)
(DE83-014592; DOE/EV-10403/11; CONF-8305115-1) Avail: NTIS HC A02/MF A01

Approaches to utilize the chemical or physical properties of collected particles to identify their origins and to apportion the aerosol mass to sources are reviewed. The most widely used method, called the chemical element balance (CEB) method, assumes that the number of source types and the elemental composition of particles from those sources are known. The mass contribution of each source to each sample is calculated using a multiple regression method. In an effort to examine how information can be directly extracted from the data, alternative methods using multivariate statistical methods are explored. A modified form of factor analysis called target transformation factor analysis has proven to be useful in resolving aerosol sources. The correlation about the origin is used as the dispersion matrix and factor rotations are made in unnormalized space. The asic concepts of the TTFA method are presented. The resolution of a data set consistng of fine particle samples taken during the Regional Air Pollution Study of St. Louis, MO at site 103 yielded five source types: motor vehicles, smelters, soil/flyash, secondary sulfate, and a fugitive dust source probably from an adjacent fertilizer processing plant. DOE

N84-11604# Louisiana State Univ., Baton Rouge. Coastal Ecology Lab.
ECOLOGICAL MODELS OF THE MISSISSIPI DELTAIC PLAIN REGION: DATA COLLECTION AND PRESENTATION
Robert Costanza, Christopher Neill, Scott G. Leibowitz, Jean R. Fruci, and Leonard M. Bahr, Jr. Mar. 1983 362 p refs Sponsored in part by Minerals Management Service
(Contract DI-14-16-0009-80-073)
(PB83-239012; FWS/OBS-82-68; LC-83-600527) Avail: NTIS HC A16/MF A01 CSCL 13B

This technical report consists of quantified ecosystem models with input-output matrices of the biology, hydrology, geology, and socioeconomics of the major habitats of the Mississippi Deltaic Plain Region. The quantitative framework characterizes the region and provides a data base for future ecological models. The habitats modeled are aggregated from thos previously identified. Detailed descriptions of the biological, physical, and socioeconomic interconnections within this coastal ecosystem allow coastal managers and decision makers to better assess the impacts of human activity on the region's natural resources. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N84-11605 Utah Univ., Salt Lake City.
NUMERICAL SIMULATION OF GLOBAL OZONE TRANSPORT DURING STRATOSPHERIC SUDDEN WARMING Ph.D. Thesis
Chung-Ming Liu 1982 239 p
Avail: Univ. Microfilms Order No. DA8305432

The variation of ozone distribution during a stratospheric sudden warming period is investigated through three numerical experiments. The first is a Lagrangian type particle tracing experiment. Air particles are released continuously from five different sources into the flows which were simulated from the global model for the study of the major warming and minor warming. The second is a numerical simulation of ozone transport in an Eulerian system (experiment P1). A three-D ozone transport diffusion model in an unequal distanced vertical resolution system is developed. It was run for 29 consecutive days. In the model, the horizontal and vertical components of eddy diffusivity are computed from the model data in the case of major warming which is divided into three stages: prewarming, warming and after-warming stages. The third experiment is designed to include the photochemical reactions in our model (experiment P2). The computation has been performed for 2 days during the warming period. Dissert. Abstr.

N84-11606 North Texas State Univ., Denton.
RELATIONSHIP OF CHARACTERISTICS OF THE RESEARCH METHODS USED IN TWO SUBFIELDS OF GEOLOGY AND THE GROWTH OF PUBLISHED RESEARCH IN THOSE SUBFIELDS Ph.D. Thesis
Mary Sue Stephenson 1982 203 p
Avail: Univ. Microfilms Order DA8307952

The major problem addressed by this study was to investigate the relationship between characteristics of the research methods used in selected subject subfields and the growth of published research in those subfields. In order to carry out the investigation a nonexperimental design was employed, and an evaluative instrument was developed for assigning a quantitative score to published research based on characteristics of the research methods utilized. Evaluative scores were thus assigned to 244 randomly selected research studies drawn from two scientific subfields manifesting different rates of growth. The data thus obtained were analyzed to test the hypothesis that a correlation

exists between the characteristics of the research methods used in a subject subfield and the growth of the published literature of that subfield. In testing this hypothesized relationship the field of geology was selected as the major discipline of interest, and the two subfields studied were geochemistry and vertebrate paleontology. Dissert. Abstr.

N84-11607 Pennsylvania State Univ., University Park.
A NUMERICAL STUDY OF THE GLOBAL AXISYMMETRIC CIRCULATION WITH VARYING HEATING AND ROTATION RATES Ph.D. Thesis
Harry William Henderson 1982 277 p
Avail: Univ. Microfilms Order No. DA8305645

A steady, axisymmetric model of the general circulation is developed as a basis for climate stability studies. The model includes the effects of heating, rotation, and internal friction, but neglects topography. It is assumed that the axisymmetric flow may be modeled by making the Boussinesq and deep convection approximations. The hydrostatic assumption is not made, thus permitting the advective terms to be included in the vertical equation of motion. The motions are forced by a specified heating distribution and dissociated through an eddy mixing coefficient formulation. The specified heating distribution is an idealized pattern based upon the observed net heating field. The eddy mixing coefficients are chosen to be representative of the observed circulation. The application of the Boussinesq, deep convection, and quasi-geostrophic assumptions limits the ranges of the heating and rotation rates. For values not far from typical atmospheric values, the model produces a stability boundary separating Rossby from Hadley flow. Dissert. Abstr.

N84-11608 Utah Univ., Salt Lake City.
PARAMETERIZATION OF SOLAR RADIATIVE TRANSFER IN CLEAR AND CLOUDY ATMOSPHERES Ph.D. Thesis
Keith Dale Hutchinson 1982 197 p
Avail: Univ. Microfilms Order No. DA8306225

The dissertation describes a parameterization model for computing solar heating rate and net flux profiles in clear and cloudy atmospheres. Specially, the model is designed to allow global circulation and climate modelers maximum flexibility when treating the effects of clouds on the atmosphere. Gaseous water vapor, ozone and carbon dioxide are the absorbers considered in the clear atmosphere. The effect of Rayleigh scatter on net flux profiles is also discussed. The parameterization method is compared with results obtained by the discrete ordinate method and the comparisons are excellent for all solar zenith angles and surface albedos in the range 0.0-1.0. Cumulus, altostratus, cirrus, and stratus reflectivities and transmissivities are parameterized to allow variations in solar zenith angle, cloud thickness, and mean cloud temperature. The latter dependence means the cloud base becomes an independent variable. Heating rate and net flux profiles for up to three clouds and a reflecting surface are presented and recursion relationships developed for computing these profiles in n-cloud layers or n-layers within a single cloud. Dissert. Abstr.

N84-11609 Washington Univ., Seattle.
A STUDY OF THE CONVECTIVE ATMOSPHERIC BOUNDARY AND SURFACE LAYERS Ph.D. Thesis
James Michael Wilczak 1982 248 p
Avail: Univ. Microfilms Order No. DA8304423

The dynamics of the dry, convective atmospheric boundary and surface layers are investigated both theoretically and empirically, with a special emphasis placed on the role coherent turbulent structures. The energetics of the dry convective boundary layer is studied by partitioning the turbulent heat flux into thermally indirect and thermally direct components as a function of z/Z. It is found that except for the inversion transition region, the thermally direct and indirect fluxes both have linear profiles. The integrated profiles indicate that a fraction A of the buoyant production of TKE is available to do the work of entrainment, where A is the boundary layer entrainment coefficient. This is shown to be, with close approximation, the energy required to redistribute the mean density profile. Sub-partitioning the thermally indirect flux into two components reveals that an upward flux of cold air is the dominant thermally indirect term throughout the bulk of the mixed layer. Dissert. Abstr.

N84-11610 State Univ. of New York, Buffalo.
THE LAPSE RATE, SURFACE ALBEDO AND GLOBAL CLIMATIC STABILITY: EXPERIMENTS WITH AN ANNUAL ZONAL ENERGY BALANCE MODEL Ph.D. Thesis
Paul Gilbert Wolfson 1982 292 p
Avail: Univ. Microfilms Order No. DA8303255

The mean annual, zonally averaged climatology is modelled by an energy balance model solved in terms of empirical normal modes expanded for convenience in Lengendre polynomials. The model is nonlinear due to inclusion of radiative transfer calculations made in an explicit model atmosphere which is parametrically related to surface level temperature. The model is solved for quasi-static normal modes using Newton's method to determine expansion coefficients corresponding to steady states. The global stability of the climate model and existence of solutions is discussed in terms of variations in factors influencing the diabatic heating and cooling--internal factors such as surface albedo and lapse rate parameterizations and external factors particularly the atmospheric carbon dioxide mixing ratio and the solar constant. Results of the sensitivity of the model to variations in structural parameters are also presented. Results show an impressive dependence of sensitivity on the lapse rate model employed, potentially making this a more important consideration in climate modeling than previously thought. Dissert. Abstr.

N84-11611 State Univ. of New York, Albany.
DIAGNOSTIC STUDIES OF ATMOSPHERIC BLOCKING PATTERNS Ph.D. Thesis
Stephen John Colucci 1982 201 p
Avail: Univ. Microfilms Order No. DA8305180

Four cases of atmospheric blocking patterns selected from recent winter seasons are quantitatively investigated in an attempt to understand the dynamical mechanisms responsible for their formation. Quasi-geostrophic model diagnosis of atmospheric data during the blocking cases reveals that the middle tropospheric geopotential height tendencies in the blocking patterns are forced by the advection of quasi-geostrophic potential vorticity associated with the synoptic scale perturbation, drawing comparable contributions from thermal and vorticity effects. The thermal forcing is linked with the temperature advection patterns accompanying the surface cyclone, superimposed or the vorticity forcing allied with the middle tropospheric perturbation. Dissert. Abstr.

N84-11612 Brown Univ., Providence, R. I.
STRESSING PROCESSES ASSOCIATED WITH GREAT CRUSTAL EARTHQUAKES AT PLATE BOUNDARIES Ph.D. Thesis
Victor Chi-Fai Li 1982 171 p
Avail: Univ. Microfilms Order No. DA8228292

Stressing processes associated with great crustal earthquakes at plate boundaries were examined. Analyses of sources of time dependence in pre and post seismic stress redistribution due to viscoelastic relaxation in the asthenosphere and to variations of shear fracture resistance with depth and strike along the plate boundary are included. The analyses are based on a model of the lithosphere as a linear elastic plate which undergoes thickness averaged deformations of plane stress type, and which is coupled through an elementary foundation model to a Maxwellian viscoelastic asthenosphere. Dissert. Abstr.

N84-11613# British Library Lending Div., Boston Spa (England).
DEVELOPMENT OF A METHOD AND APPARATUS FOR QUANTITATIVE ASSESSMENT OF THE IRON CONTENT OF ROCKS AND ORES BY MEANS OF DATA OBTAINED FROM BOREHOLE RADIOMETRY
A. M. Blyumentsev and V. B. Migunov 18 Aug. 1983 15 p Transl. into ENGLISH from Vses. Nauchno Tekh. Geofiz. Konf. 5th (USSR), 1967 p 525-530 Conf. held in Novosobersk, 1963
(BLL-M-28724-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Readings produced by gamma-gamma logging are inversely related to the density of the rocks being studied, provided specified conditions are met. This fact can be used to identify iron-rich ores, which are characterized by their high densities in relation to the surrounding rocks. The presence of a link between the intensity of dispersed gamma radiation and the density of iron-bearing rock is not sufficient in itself to form the basis of a method of quantitative analysis because the relationship between rock density and iron content is disturbed by the nonconstant nature of the porosity factor. A two-channel borehole scintillation radiometer was developed which simultaneously and separately indicates the soft and hard dispersed gamma radiation together with their ratio. Results obtained when using the instrument to qualitatively estimate the iron content in mountain rocks and ores are tabulated. Side-by-side use of magnetic susceptability and spectral ration surveys could open the way to noncore type documentation of boreholes since the readings are not affected by the porosity of the rocks. A.R.H.

N84-11614 Washington Univ., Seattle.
HORIZONTAL ENERGY PROPAGATION AND BAROTROPIC INSTABILITY IN A QUASI-LINEAR MODEL OF THE ATMOSPHERE Ph.D. Thesis
Grant Webster Branstator 1982 131 p
Avail: Univ. Microfilms Order No. DA8308596

Observational studies suggest that the nondivergence barotropic vorticity equation may be a useful analog for studying dynamical processes which contribute to the monthly timescale of atmospheric flow. this dissertation describes an investigation of two important processes in such a model: horizontal energy propagation and instability of the flow. Emphasis is placed on how the horizontal structure of the time mean flow can influence these processes. A model which is linearized about a basic state which varies in latitude and longitude is used throughout the study. In teh examination of energy propagation, many of the results can be analyzed by locally applying tools developed for zonally symmetric basic states, e.g., ray tracing and refractive indices. Simple background flows are constructed which have critical lines, reflective surfaces, wave guides, and propagating regions which are confined longitudinally. An example is given in which longitudinal derivatives of the basic state are significant. Dissert. Abstr.

N84-11615 Colorado Univ., Boulder.
A DETERMINATION AND ANALYSIS OF POLAR MOTION Ph.D. Thesis
Richard Stewart Gross 1982 260 p
Avail: Univ. Microfilms Order No. DA8309846

The details of the method used to obtain a polar motion data set are presented. The recently re-reduced International Latitude Service (ILS) latitude observations to obtain the amplitudes of the largest forced nutation terms was used. However, the errors in the recovered nutation amplitudes are too large to allow us to discriminate between the current theoretical results. After removing the observed results from the ILS latitude values the position of the pole along with station corrections by a novel damped least squares technique were obtained. The observed trends in the station corrections cannot be caused by continental drift. The popular motion time series has its data points spaced at intervals of 19 days. By removing the mean, the trend and the annual term a time series was obtained that was used to study the Chandler Wobble. The trend in the polar motion time series is interpreted as a secular draft of the pole at an average rate of 3.9 milliarc seconds per year in the direction of -70 E longitude.
Dissert. Abstr.

N84-11616 Wisconsin Univ., Milwaukee.
TOPICS IN GRAVITATION AND GAUGE FIELDS Ph.D. Thesis
Todd Kevin Leen 1982 143 p
Avail: Univ. Microfilms Order No. DA8313241

Quantum mechanical effects of classical gravitational radiation are addressed. The use of the interstellar medium itself as a remote quantum mechanical detector of gravitational waves is investigated. The theory of quantized fields on curved space times is examined. In the first of these studies, a naive model of cosmological baryon synthesis is examined. The model incorporates a hard CP violation as well as a baryon (and lepton) nonconserving interaction and is thus capable of generating an excess of matter over antimatter. The time dependent background geometry of the early universe drives the interaction producing net excess of baryon/lepton pairs. An interaction picture and diagram technique valid in curved space times is developed. The consequences of initially present baryons and leptons are explored. The question of renormalizability of non-Abelian gauge fields theories in a general curved space time is addressed.
Dissert. Abstr.

N84-11617# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SOLAR WIND ENERGY TRANSFER TO THE TERRESTRIAL MAGNETOSPHERE BY MAGNETIC JUNCTION IN THE MAGNETOPAUSE [TRANSFERENCIA DE ENERGIA DO VENTO SOLAR A MAGNETOSFERA TERRESTRE DEVIDO A JUNCAO MAGNETICA NA MAGNETOPAUSA]
Alicia L. C. Gonzalez, W. D. Gonzalez, and M. Virginia A. Jardim Aug. 1983 24 p refs In PORTUGUESE; ENGLISH summary
(INPE-2848-RPE/439) Avail: NTIS HC A02/MF A01

An expression for the energy transfer due to magnetopause reconnection, as well as related expressions for the convection and parallel electric fields, are presented. These expressions are derived from a reconnection model centered at the magnetopause nose, and that considers the presence of the clefts. The expression for the convection electric field related energy transfer reduces to the substorm parameter epsilon for the special case of equal magnetosheath and geomagnetic field amplitudes. This result suggests that the reconnection electric field is transmitted along a tilted reconnection line, but that the convection field is only related to the 'dawn to dusk' component of the reconnection electric field. Author

N84-11618# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VERTICAL MAPPING OF QUASISTATIC AND LARGE SCALE IONOSPHERIC ELECTRIC FIELDS IN LOW LATITUDES [MAPEAMENTO VERTICAL DE CAMPOS ELETRICOS IONOSFERICOS QUASE-ESTATICOS E DE GRANDE ESCALA EM BAIXAS LATITUDES]
S. L. G. Dutra, W. D. Gonzalez, A. L. C. Gonzalez, I. R. C. A. Pinto, and O. Pinto, Jr. Aug. 1982 26 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC
(INPE-2838-PRE/385) Avail: NTIS HC A03/MF A01

Some results of studies on the downward vertical mapping of large scale and quasi static ionospheric electric fields, for the low latitude atmosphere, are presented. There mapping studies are also extended to cases when gradients of the middle atmospheric electric conductivity are present, as in the case of the South Atlantic Magnetic Anomaly, where intensifications of energetic particle precipitation are expected to affect the local middle atmosphere.
Author

N84-11619# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STUDY ON THE APPLICABILITY OF THE INTERNATIONAL IONOSPHERIC MODEL IRI 79 FOR OBTAINING ELECTRON DENSITY PROFILES [UM ESTUDO SOBRE A APLICABILIDADE DO MODELO INTERNACIONAL DE IONOSFERA IRI 79 PARA OBTENCAO DE PRFIS DE DENSIDADE ELETRONICA EM CACHOEIRA PAULISTA]
E. R. dePaula, A. C. R. deSouza, I. J. Kantor, and S. L. G. Dutra Jul. 1983 15 p refs In PORTUGUESE; ENGLISH summary Submitted for publication
(INPE-2817-PRE/372) Avail: NTIS HC A02/MF A01

The International Reference Ionosphere model, IRI 79, was implemented for the B6800 computer of INPE, allowing to obtain average profiles of the ionospheric electron density. In order to verify the validity of the utilization of the IRI 79 model in the Brazilian

region, a comparison was made between IRI 79 profiles and profiles from ionograms obtained in Cachoeira Paulista (23 S, 45 W). Very good agreement was observed between profiles predicted (IRI 79) and observed for all the analyzed months and hours, except in small height intervals and in the lower parts of the Cachoeira Paulista profiles, where disagreement was observed. The implications of the use of the IRI model in propagation studies is briefly analyzed. Author

N84-11620# Instituto de Pesquisas Espaciais, Sac Jose dos Campos (Brazil).
TIDAL AND SOLAR CYCLE EFFECTS ON THE OI 5577 ANGSTROM, NaD AND OH(8,3)AIRGLOW EMISSIONS OBSERVED AT 23 DEG S
H. Takahashi, Y. Sahai, and P. P. Batista Oct. 1983 17 p refs Submitted for publication
(INPE-2901-PRE/419) Avail: NTIS HC A02/MF A01

The upper mesosphere airglow emissions OI 5577, NaD and OH were observed at Cachoeira Paulista (22.7 S; 45.0 W) Brazil. Nocturnal variations and their seasonal dependencies in amplitude and phase, and the annual variations of these emissions are presented, analyzing the data obtained from 1977 to 1982 during the ascending phase of the last solar cycle. The nocturnal variations of the OI 5577 emission and the OH rotational temperature showed a significant semidiurnal oscillation, with the phase of maximum moving from the midnight in January to early morning in June. Semiannual variation of the OI 5577 and NaD emissions with the maximum intensities in April/May and October/November were observed. The OH rotational temperature, however, showed an annual variation, maximum in summer and minimum in winter, while no significant seasonal variation was found in the OH emission intensities. Long term intensity variations are also presented with the solar sunspot numbers and the 10.7 cm flux. Author

N84-11621# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A STUDY OF THE SURFACE LAYER ON AN EXTREMELY ROUGH SURFACE [US ESTUDO DA CAMADA LIMITE SUPERFICIAL SOBRE SUPERFICIE EXTREMAMENTE RUGOSA]
Leonardo D. Abreu Sa and Luiz Carlos B. Molion Jul. 1983 36 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC, Belem, Paraguay, 6-15 Jul. 1983
(INPE-2829-PRE/381) Avail: NTIS HC A03/MF A01

Experimental data for the surface layer obtained over a rough surface of a tropical savannah were used to compute the stability functions for momentum (phi sub M) and sensible heat (phi sub H) under unstable conditions. The computed functions are considerably different from those published for smooth surfaces. The analysis also shows a variation of (phi sub H) with the ratio r=H sub T/H where H sub T is the sensible heat flux measured with an eddy correlation apparatus and H the sensible heat flux computed from the energy balance equation. These flux curves agree quite well. However they present a phase difference which produces a diurnal variation of r, with mean hourly values greater than 2.0 after 14:00 hrs. LT. Author

N84-11622*# California Inst. of Tech., Pasadena. Seismological Lab.
WAVEFORM INVERSION OF MANTLE LOVE WAVES: THE BORN SEISMOGRAM APPROACH
Toshiro Tanimoto [1983] 44 p refs
(Grants NsG-7610; NSF EAR-81-15236)
(NASA-CR-174483; NAS 1.26:174483; Contrib-3996) Avail: NTIS HC A03/MF A01

Normal mode theory, extended to the slightly laterally heterogeneous Earth by the first-order Born approximation, is applied to the waveform inversion of mantle Love waves (200-500 sec) for the Earth's lateral heterogeneity at l=2 and a spherically symmetric anelasticity (Q sub mu) structure. The data are from the Global Digital Seismograph Network (GDSN). The l=2 pattern is very similar to the results of other studies that used either different methods, such as phase velocity measurements and multiplet location measurements, or a different data set, such as mantle Rayleigh waves from different instruments. The results are carefully analyzed for variance reduction and are most naturally explained by heterogeneity in the upper 420 km. Because of the poor resolution of the data set for the deep interior, however, a fairly large heterogeneity in the transition zones, of the order of up to 3.5% in shear wave velocity, is allowed. It is noteworthy that Love waves of this period range can not constrain the structure below 420 km and thus any model presented by similar studies below this depth are likely to be constrained by Rayleigh waves (spheroidal modes) only. Author

N84-11623# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BEHAVIOR OF THE TOTAL ELECTRON CONTENT IN THE IONOSPHERE IN SAO JOSE DOS CAMPOS DURING MAGNETIC STORMS IN 1980 Final Report [COMPORTAMENTO DO CONTEUDO ELETRONICO TOTAL DA IONOSFERA EM SAO JOSE DOS CAMPOS DURANTE TEMPESTADES MAGNETICAS EM 1980]
Eurico R. dePaula, M. A. Abdu, and I. J. Kantor Jul. 1983 25 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Ann. Meeting of SBPC, Belem-Pa., Brazil, 6-13 Jul. 1983
(INPE-2810-PRE/368) Avail: NTIS HC A02/MF A01

Faraday rotation data from 1980, obtained with a polarimeter at Sao Jose dos Campos, were analyzed during periods occurring magnetic storms. In order to select these periods, the magnetic index Dst was used. It was observed that during magnetic storms preceeded by a few calm days, an increase in the Total Electron Content (TEC) is observed during the storm main phase, relative to the mean of the magnetic calm days (positive phase). Afterwards, during the storms recovery phase, a decrease was registered relative to the average (negative phase). This TEC behavior, observed at low latitudes storms, is typical of the behavior over medium latitudes. But, when several storms occur with few intervening days between them, the positive phase seems to prevail. This indicates an inibition of the source of the negative phase. This work discusses the possible origins of the positive and negative phases. Author

N84-11624*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PREDICTABILTY OF TIME AVERAGES: THE INFLUENCE OF THE BOUNDARY FORCING
J. Shukla Apr. 1982 68 p refs Summary of lectures given at the Seminar on Probl. and Prospects in Long and Medium Range Weather Forecasting, Reading, England, 14-18 Sep. 1981
(NASA-TM-85092; NAS 1.15:85092) Avail: NTIS HC A04/MF A01 CSCL 04A

The physical mechanisms through which changes in the boundary forcings of SST, soil moisture, albedo, sea ice, and snow influence the atmospheric circulation are discussed. Results of numerical experiments conducted with the GLAS climate model to determine the sensitivity of the model atmosphere to changes in boundary condiditons of SST, soil moisture, and albedo over limited regions are dicussed. It is found that changes in SST and soil moisture in the tropic produce large changes in the atmospheric circulation and rainfall over the tropics as well as over mid-latitudes. Author

N84-11625# Air Force Geophysics Lab., Hanscom AFB, Mass.
NEW TECHNIQUES FOR ABSOLUTE GRAVITY MEASUREMENTS
James A. Hammond, Robert L. Iliff, and Roger W. Sands 7 Jan. 1983 12 p refs
(AF Proj. 7600)
(AD-A129285; AFGL-TR-83-0016; AFGL-ERP-820) Avail: NTIS HC A02/MF A01 CSCL 08/5

A brief history and the present status of a system for the measurement of absolute gravity is presented. Various corrections to the measured value are also given. Author (GRA)

N84-11626# Naval Research Lab., Washington, D. C. Atmospheric Physics Branch.

MEASUREMENTS OF ATMOSPHERIC AEROSOLS: EXPERIMENTAL METHODS AND RESULTS OF MEASUREMENTS OFF THE EAST COAST OF THE UNITED STATES Interim Report

William A. Hoppel, James W. Fitzgerald, and Reginald E. Larson 19 Jul. 1983 71 p refs

(AD-A130998; NRL-8703) Avail: NTIS HC A04/MF A01 CSCL 04/1

Accurate measurements of the size distribution of atmospheric aerosols in the size (radius) range from 0.006 to 2.2 micrometers made along the east coast of the United States--both at a shore site (Wallops Island) and from a ship within 300 km of the coast--are presented. Some measurements at Washington, D.C., are included to contrast urban aerosols with aged continental air off the east coast. As air advects from land to sea, there is a rather rapid decay of particles smaller than 0.05 micrometers during the first day or so. After this initial decay of small particles the size distribution was often found to remain remarkably stable for hours. Significant changes in the size distribution were often associated with changes in air masses and meteorological conditions. Some of the changes can be explained qualitatively. Others, such as a pronounced double peak which occurred occasionally in the fine-particle range, are difficult to understand. Measurements of the activation parameter for submicrometer particles were also made and yield values in the range of 0.1 to 0.55. Using the measured size distribution, electromagnetic extinction was calculated for the wavelength range 0.3 to 12 micrometers. The calculations compare favorably to the measured scattering coefficient at 0.55 micrometers in wavelength. Particles in the radius range 0.1 to 0.3 micrometer made the largest contribution to the total extinction at optical wavelengths on nearly all occasions. GRA

N84-11627# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Earthquake Engineering and Geophysics Div.

CAVITY DETECTION AND DELINEATION RESEARCH. PART 2. SEISMIC METHODOLOGY: MEDFORD CAVE SITE, FLORIDA Technical Progress Report, May 1979 - Nov. 1980

Joseph R. Curro, Jr. Jun. 1983 103 p refs

(AD-A131322; WES/TR/GL-83-1-2) Avail: NTIS HC A06/MF A01 CSCL 17/10

As part of a research program designed to find a quick and economical methodology to detect and delineate cavities, seismic technology was applied to the cavity problem at the Medford Cave site, Florida. Six seismic techniques consisting of surface refraction, constant-spacing, fan-shooting, surface shear-wave, uphole refraction, and crosshole investigations were employed at the site in an effort to detect and delineate cavity features. The results of these tests indicated that the surface refraction, constant-spacing, and crosshole techniques detected and partially delineated cavities. Their degrees of success varied. In summary, the constant-spacing technique is the only surface seismic test procedure recommended for use in cavity detection-delineation and the crosshole P-wave technique is the only subsurface method recommended. GRA

N84-11628# Mission Research Corp., San Diego, Calif.

NUCLEAR-INDUCED LIGHTNING AURORA EXPERIMENT

J. W. Erler, B. C. Passenheim, W. G. Vulliet, and V. A. J. VanLint 11 Aug. 1982 68 p refs

(Contract DNA001-81-C-0151)

(AD-A131274; MRC/SD-R-103; DNA-TR-81-158) Avail: NTIS HC A04/MF A01 CSCL 04/1

Nuclear lightning has been experimentally produced at AURORA. The propagation velocity, the current carried by the streamer and other parameters were measured. The results are compared with existing models. GRA

N84-11629# Emmanuel Coll., Boston, Mass.

GEOMAGNETIC

N Final Scientific Report, 1 Sep. 1978 - 30 Sep. 1981

Elwood Maple Sep. 1982 58 p refs

(Grant AF-AFOSR-34677-77; AF Proj. 3211)

(AD-A131448; AFOSR-83-0632TR) Avail: NTIS HC A04/MF A01 CSCL 08/11

Work has been devoted to experimental studies of middle-latitude geomagnetic pulsations in the period range 0.2 to 50 minutes. The principal effort has been on the resonant periods of the pulsations which arise from hydromagnetic resonances in the magnetosphere. The resonant periods appear as peaks in the period distributions and frequency spectra of the pulsations. The present work utilizes polarization traces which provide continuous displays of the polarization of the pulsations in selected period bands. This analysis technique was conceived some time ago. The early studies established that hydromagnetic (HM) waves were frequently observed throughout the 0.2 to 50 minute period range and that waves of several different periods were often observed simultaneously during both magnetically quiet and disturbed intervals. That effort was terminated before the potentialities of the technique had been exploited, and the early results were not widely disseminated. Some of the original data have been resurrected for the initial work under this grant, and the analysis technique has been extended. GRA

N84-11630# SRI International Corp., Menlo Park, Calif.

HIGH-LATITUDE AND EQUATORIAL RESEARCH SUPPORT FOR PREDICTING HIGH-ALTITUDE NUCLEAR EFFECTS

Charles L. Rino, James F. Vickrey, Robert C. Livingston, and Roland T. Tsunoda 1 Aug. 1982 54 p refs

(Contract DNA001-81-C-0076; DNA Proj. S99-QAXH)

(AD-A131431; DNA-TR-81-176) Avail: NTIS HC A04/MF A01

This report summarizes the high latitude and the equatorial natural ionospheric research support that has been conducted to improve and extend high altitude nuclear predictive capability. This work marks the formal completion of the equatorial research effort. That effort has been very successful and the results are summarized in detail. The primary future effort will be directed toward aurural phenomena. The preliminary work in this area is described in the report. GRA

N84-11631# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Vehicle Protection Branch.

THE ROCKET-TRIGGERED LIGHTNING INVESTIGATION Final Progress Report, Oct. 1980 - Sep. 1981

Charles W. Schubert, Jr. and Richard D. Richmond May 1983 83 p refs

(AF Proj. 2402)

(AD-A131409; AFWAL-TR-83-3031) Avail: NTIS HC A05/MF A01 CSCL 04/1

The 1981 progress of the Rocket Triggered Lightning Investigation program is reported. In a Lightning Strike Object (LSO) was designed, fabricated and instrumented. A Lightning Strike Scaffold capable of elevating the LSO above the ground plane was constructed atop South Baldy Mountain, near Socorro, New Mexico. During the summer thunderstorm season, the LSO was hoisted into the Strike Scaffold and was subjected to over forty nearby and attached triggered lightning strikes. The recorders available for the 1981 program were insufficiently responsive to provide high quality data on lightning interaction characteristics; however, all sensors and data links where proved to be operable. The primary finding was that lightning-object interaction data can be reliably and repeatedly acquired through the directing of triggered lightning to an instrumented target object. The report includes a detailed description of the system developed for the program, a discussion of system limitations, and results of the effort as of September 1981. GRA

N84-11632# Physical Dynamics, Inc., Bellvue, Wash.

IMPROVEMENT OF THE SCINTILLATION-IRREGULARITY MODEL IN WBMOD Final Report, 1 Jan. 1981 - 31 Dec. 1982

James A. Secan and Edward J. Fremouw 28 Feb. 1983 99 p refs

(Contract DNA001-81-C-0092)

(AD-A131536; PD-NW-83-285R; DNA-TR-81-241) Avail: NTIS HC A05/MF A01

The descriptive model of scintillation-producing irregularities in the F layer contained in Program WBMOD has been improved,

along with other aspects of the code. Improvements include use of magnetic local time for modeling high-latitude boundaries, correction of a subtle error in calculating the scan velocity of the radio line of sight, simplification of the orbit calculation, and implementation of an irregularity drift routine based on a recently published model of ionospheric convention at high latitudes. In preparation for future improvements in WBMOD, analysis and interpretation of the Wideband Satellite data base from Poke Flat, Alaska was continued. The utility of the phase-gradient ratio (i.e., the ratio of rms phase difference for interferometer baselines perpendicular and parallel to known sheetlike irregularities) was investigated for determining irregularity axial ratios and was found to be of potential use. The ratio varies strongly, however, with the phase spectral index, p. Thus, quantitative use of the phase-gradient ratio depends upon prior evaluation of the geophysical and geometrical behavior of p. GRA

N84-11633# California Univ., Berkeley.
SEISMOLOGICAL STUDIES AT THE CERRO PRIETO FIELD, 1978 - 1982
E. L. Majer and T. V. McEvilly Oct. 1982 8 p refs Presented at 4th Symp. on the Cerro Prieto Geothermal Field, Guadalajara, Mexico, 10 Aug. 1982
(Contract DE-AC03-76SF-00098)
(DE83-013844; LBL-14896; Cerro-Prieto-24; CONF-8208109-7) Avail: NTIS HC A02/MF A01

Varied seismological studies were conducted to determine the static and dynamic properties of the Cerro Prieto geothermal field. Sought were the relation of wave propagation characteristics and microearthquake activity to such features as production boundaries, recharge zones, heat sources, fluid strata, lithology and structure. Discussed are the results of the studies carried out since 1978 in light of the current knowledge of the Cerro Prieto field. Also included are interpretations of the reflection surveys carried out in the immediate production areas. DOE

N84-11634# Los Alamos Scientific Lab., N. Mex. Earth and Space Sciences Div.
MODELING OF MODIFICATION EXPERIMENTS INVOLVING NEUTRAL-GAS RELEASE
Paul A. Bernhardt 1983 8 p refs Presented at the Intern Symp. on Active Expt. in Space, Alpbach, Austria, 23-27 May 1983
(Contract W-7405-eng-36)
(DE83-012785; LA-UR-83-1416; CONF-830571-2) Avail: NTIS HC A02/MF A01

Many experiments involve the injection of neutral gases into the upper atmosphere. Examples are critical velocity experiments, MHD wave generation, ionospheric hole production, plasma striation formation, and ion tracing. Many of these experiments are discussed in other sessions of the Active Experiments Conference. This paper limits its discussion to: (1) the modeling of the neutral gas dynamics after injection, (2) subsequent formation of ionosphere holes, and (3) use of such holes as experimental tools. DOE

N84-11635# Los Alamos Scientific Lab., N. Mex.
CREATING UNSTABLE VELOCITY-SPACE DISTRIBUTIONS WITH BARIUM INJECTIONS
Morris B. Pongratz 1983 7 p refs Presented at the Intern. Symp. on Active Expt. in Space, Alpbach, Austria, 24-28 May 1983
(Contract W-7405-eng-36)
(DE83-012783; LA-UR-83-1429; CONF-830571-1) Avail: NTIS HC A02/MF A01

Large Debye lengths relative to detector dimensions and the absence of confining walls makes space and attractive laboratory for studying fundamental theories of plasma instabilities. However, natural space plasmas are rarely found displaced from equilibrium enough to permit isolation and diagnosis of the controlling parameters and driving conditions. Furthermore, any plasma or field response to the departure from equilibrium can be masked by noise in the natural system. Active experiments provide a technique for addressing the chicken or egg dilemma. Early thermite barium releases were generally conducted at low altitudes from sounding rockets to trace electric fields passively or to study configuration-space instabilities. One can also study velocity-space instabilities with barium releases. Neutral barium vapor releases wherein a typical speed greatly exceeds the thermal speed can be used to produce barium ion velocity-space distributions that should be subject to a number of microinstabilities. DOE

N84-11636# Alaska Univ., Fairbanks. Geophysical Inst.
OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA Final Report
Jul. 1983 29 p refs
(Contracts DE-AT06-76ER-70006; EY-76-S-06-2229)
(DE83-016673; DOE/ER-70006/T6-9; RLO-2229-T6-9) Avail: NTIS HC A03/MF A01

The installation and operation of a seismic network to provide data for the investigation into the semismotectonics of the eastern portion of the Alaska-Aleutian arc is reviewed. The program described and an earthquake catalog is presented along with results of studies based on the network. DOE

N84-11637# Bundesanstalt fuer Geowissenschaften und Rohstoffe, Hannover (West Germany).
ON THE GENESIS OF HYDROCARBONS IN THE GERMAN ALPINE FORELAND Final Report, Sep. 1981
Hermann Wehner, Heinz Hufnagel, Kore Kuckelkorn, Martin Schoell, and Manfred Teschner Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 164 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-103; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

Determination of data relevant to the generation of crude oils in the Molasse Basin is treated. Correlation of crude oils and potential source rocks by standard geochemical techniques, biomarkers (tetracyclic steranes and pentacyclic triterpanes) and carbon and hydrogen isotope measurements was investigated. Thermal history of sediments was reconstructed using maturity parameters (vitrinite reflectance) and borehole temperatures. Results show that the oils from the eastern Molasse Basin were sourced mainly in the Pretertiary, in the western Molasse Basin, the Mesozoic and also the lower Tertiary may have acted as source rocks. In the eastern part of the Molasse Basin liquid hydrocarbon accumulations may exist below the Alpine nappes, whereas in the western part mainly gas accumulations are expected in autochthonous series below the Alps if the zone of high maturity observed in the foreland extends to the south. Author (ESA)

N84-11638# Prakla-Seismos G.m.b.H., Hannover (West Germany).
SYSTEM FOR RECORDING, PROCESSING AND INTERPRETING VERTICAL SEISMIC PROFILES Final Report, Dec. 1981
Karsten Koehler Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 146 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-152; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31

Data quality of vertical seismic profiles (VSP) recordings is dealt with. Source signature deconvolution, source signal amplitude compensation, automatic orientation of the horizontal components within three component records, VSP deconvolution, signal separation of different seismic waves, static and dynamic travel time corrections, analyses of travel times and amplitudes, evaluation of the reflector dip, processing of records with constant receiver position and a series of source positions were studied. Testing with synthetic and real measuring results proved the practicability and the efficiency of the processing method. Author (ESA)

N84-11639# Niedersaechsisches Landesamt fuer Bodenforschung, Hannover (West Germany).
MIGRATION OF NATURAL GAS AND RESEVOIR FORMATION IN EAST LOWER SAXONY Final Report, May 1979
Hermann Jurgan, Lazlo Devay, Martin Block, Dirk Kettel, and Gerhard Mattern Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 78 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-153; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,50

Natural gas exploration is dealt with. Eleven seismic horizons were mapped in a 5000 sq km area of Gamma logs and drill cores were used to obtain the facies distribution pattern of the Permian sandstone. Vitrinite reflectance data and the history of the development of the basin provided information for the theoretical paleotemperature gradient. The paleogeography of the carboniferous and the structural development of the basin led to estimates of the amount of natural gas generated and its migration. It is concluded that Permian sandstone contains several structures of different sizes, which very likely have different reservoir properties. The underlying carboniferous coal is theoretically sufficient to fill these structures with natural gas. Geologically, the area has good prospects for natural gas. Author (ESA)

N84-11640 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
SOLAR HIGH AND LOW TEMPERATURE APPLICATION FOR ARID COUNTRIES
Guenther Schmidt and Helmut Zewen 1982 9 p refs Presented at 4th Intern. Sonnenforum, Berlin, 6-9 Oct. 1982
(MBB-UR-583-82-OE) Avail: Issuing Activity

A 100 kWel/500Wth solar farm type power station was built next to a large reservoir in an arid region as the basis of a food/water/power system, providing energy for irrigation, desalination, refrigeration and air conditioning. The system can replace fossil fuels in cases where heat is required in the temperature range from 80 to 400 C, for example by small and medium scale agricultural users. Point focusing parabolic dish collectors are used since their efficiency decreases more slowly than other types as temperatures rise. The dish absorber enables a liquid-vapor phase change to occur in the absorber, eliminating the need for a two loop system. The economic feasibility of the solar farm is demonstrated. Author (ESA)

N84-11641# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
AURORAL ARC CLASSIFICATION SCHEME BASED ON THE OBSERVED ARC-ASSOCIATED ELECTRIC FIELD PATTERN
Goeran Marklund Jun. 1983 49 p refs Sponsored by Swedish Board of Space Activities
(TRITA-EPP-83-01; ISSN-0348-7539) Avail: NTIS HC A03/MF A01.

Rocket double probe and observations from the literature, for various geophysical conditions, are used to organize auroral arc types on a physical rather than morphological basis. Classification is based on the relative influence on the electric field pattern of polarization electric fields and Birkeland currents. Sounding rockets observations are shown to be better than monostatic radar observations for determining the tangential electric field. Depending on the dominating mechanism, estimated quantitatively for a number of arc-crossings, arc types are grouped into: polarization arcs, Birkeland current arcs and combination arcs. The high altitude potential distributions corresponding to different arc types are presented. Author (ESA)

N84-11642# Danish Space Research Inst., Lyngby.
OCCURRENCES OF THE POLAR SLANT E CONDITION (SEC) AT NARSSARSSUAQ, GODHAVN, THULE, 1981
I. S. Primdahl 1983 49 p refs
(ISSN-0108-2922) Avail: NTIS HC A03/MF A01

Monthly data sheets of quarter and half hourly slant E occurrences at Nassarssuaq, Godhavn and Thule in 1981, scaled from ionograms, are presented. Author (ESA)

N84-11643# Global Geochemistry Corp., Canoga Park, Calif.
ANALYSIS OF GASES IN THE EARTH'S CRUST Annual Report, 1 Jan. 1982 - 31 Dec. 1982
Robert L. Brewer Apr. 1983 85 p refs
(PB83-243972; GRI-81/0167) Avail: NTIS HC A05/MF A01 CSCL 08D

Given the uncertainty of future world energy reserves, current knowledge of the origin and nature of natural gas needs to be expanded. The relative importance of processes of formation of natural gas will help in decision making for future exploration programs. The objective of this report is to define the origin, migration and present distribution of methane in the earth's crust, with particular emphasis on identifying abiogenic methane. GRA

N84-11644# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.
STUDIES RELATED TO THE DEEP EARTH GAS Annual Report, Jan. - Dec. 1982
Thomas Gold, Elizabeth Bilson, and Steven Soter Jan. 1983 73 p
(PB83-244004; GRI-82/0048) Avail: NTIS HC A04/MF A01 CSCL 21D

The purpose of this research is to elucidate the origin of terrestrial hydrocarbons, principally of methane and petroleum. The authors report here their continued progress in experimental and theoretical studies conceived for this purpose. The role of methane in petroleum formation is being investigated in the study of two different type of reactions: the interaction of methane with petroleum hydrocarbons at high pressure and temperature and hydrocarbon reforming in methane pyrolysis. Evidence for the effectiveness of both processed is accumulating. Work is continuing on the pilot unit of a ground gas pressure monitoring system. They have carried out major theoretical studies on the relationship of nitrogen, helium and methane in the ground and on the mechanism of fluid migration in solid rock. GRA

N84-11645 Catholic Univ. of America, Washington, D.C.
SOME CHARACTERISTICS OF MIDLATITUDE F LAYER STORMS GENERATED BY THERMOSPHERE-PLASMASPHERE COUPLING PROCESSES Ph.D. Thesis
Nathan John Miller 1983 173 p
Avail: Univ. Microfilms Order No. DA83-06542

Calculations made to describe stormtime variations in equinoctial dayside plasma parameters when the variations are primarily caused by processes dependent upon collisional coupling between the thermosphere and the plasmasphere are described. The calculations are made with a computer model formed by linking two theoretical models: a pre-existing thermospheric model that describes dayside variations in thermospheric parameters during stormtime heating of the thermosphere; a plasmaspheric model to describe dayside plasmaspheric variations caused by the thermospheric variations described by the thermospheric model and by variations in a magnetospheric electric field. Both portions of the computerized storm model solve partial differential equations describing conservation of species, momentum, and energy by replacing dependent variables with expansions in time series.
Dissert. Abstr.

N84-11646 Wisconsin Univ., Milwaukee.
GRAVITATIONAL PERTURBATION OF THE HYDROGEN SPECTRUM Ph.D. Thesis
Luis Octavio Pimentel 1982 105 p
Avail: Univ. Microfilms Order No. DA83-13245

The most viable theories of gravitation are metric theories. In these theories the gravitation is manifested as a curvature of spacetime and it is characterized by the Riemann tensor. It is of great interest to measure, or to put an upper bound on, the Riemann tensor. The energy shifts caused by the gravitational interaction on the Hydrogen spectrum provide a way of carrying out such measurements. The perturbation of the energy levels of a freely

falling one-electron atom in an arbitrary curved spacetime are considered. Another investigation reported in this thesis is the use of Hydrogen atoms as remote quantum detectors of gravitational waves. Finally, the energy shifts of an accelerated atom in flat spacetime are considered. The Hamiltonian and the energy shifts are calculated to first order in the acceleration. The possibility of parity violating effects is also studied. Dissert. Abstr.

N84-11529# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
EXPERIMENT TO MEASURE MICROKINEMATIC PROCESSES ON THE SURFACE OF THE EARTH [EIN EXPERIMENT ZUR MESSUNG MIKROKINEMATISCHER PROZESSE AN DER ERDOBERFLAECHE]
M. Bonatz *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 1-8 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N84-11647 California Univ., Los Angeles.
THE MELTING SPHERICAL ICE PARTICLES FALLING AT TERMINAL VELOCITY IN AIR: AN EXPERIMENTAL AND THEORETICAL STUDY Ph.D. Thesis
Roy Martin Rasmussen 1982 416 p
Avail: Univ. Microfilms Order No. DA8306108

This study utilized the UCLA cloud physics wind tunnel and the IBM 3033 computer. The wind tunnel experiments were conducted using two separate procedures, depending on the size of the spherical particle. Particles less than 1 mm diameter, were melted in free fall while experiencing a time varying environmental temperature, similar to the variation of temperature it would encounter while freely falling in the atmosphere. Particles larger than 1 mm diameter have a tendency to wander towards the tunnel walls, requiring restraint by a thin nylon fiber frozen halfway through the particle. Using this fiber, the particle was suspended from above. Although attached to a thread, the particle's terminal velocity was constantly maintained during melting by keeping the fiber slack. Particles less than 1 mm diameter usually undergo sailing motions upon melting due to the melting of surface protuberances. Once the protuberances are melted, the particle falls with no horizontal drift. The melting ice core was observed to remain tangent with the downstream end of the particle.
Dissert. Abstr.

N84-11648 Colorado State Univ., Fort Collins.
ON THE PHYSICAL PROCESSES RESPONSIBLE FOR TROPICAL CYCLONE MOTION Ph.D. Thesis
Johnny Chung Leung Chan 1982 211 p
Avail: Univ. Microfilms Order No. DA8306554

The possible physical processes involved in tropical cyclone motion were investigated. The relation between the synoptic-scale flow around tropical cyclones and cyclone movement were analyzed. In most cases, tropical cyclones in the Northern (Southern) Hemisphere move to the left (right) of and faster than their environmental flow. To understand these observations, an analytical study using a simplified form of the vorticity equation was performed. The results show the importance of the environmental flow and change in the Coriolis parameter across the cyclone in determining cyclone motion. The locations of maximum local changes of relative vorticity can be interpreted to correspond to the observational results. Dissert. Abstr.

N84-11649 Colorado State Univ., Fort Collins.
NUMERICAL EXPERIMENTS ON THE FORMATION AND MAINTENANCE OF CIRRIFORM CLOUDS Ph.D. Thesis
David OConnell Starr 1982 372 p
Avail: Univ. Microfilms Order No. DA8306591

The role and relative importance of the dynamic and diabatic processes influencing the formation and maintenance of ice phase stratiform clouds are investigated at the cloud scale. The primary focus is on fair weather cirrus. A two-dimensional, time dependent, Eulerian numerical model is developed. The grid interval is 100 m and the domain is a vertical plane of approx. 3 km depth and approx. 6 km horizontal extent. The influence of larger scale processes are incorporated via a specified basic state vertical velocity and the initially specified thermodynamic structure. In addition to energy transformations between potential and kinetic forms and advection by the resolved wind field, other important physical processes, which are incorporated into the model in a parametric fashion, are transports due to subgrid scale processes, phase changes of water, infrared and short-wave radiative processes and the relative fall velocity of cloud particles. The parameterizations are based upon observations and theoretical consideration. This model is unique in its applicability to ice phase stratiform clouds. Dissert. Abstr.

N84-11650 Washington Univ., Seattle.
A COMPARISON OF BAROCLINIC EDDY HEAT-TRANSPORT PARAMETERIZATIONS TO A SIMPLIFIED GENERAL CIRCULATION MODEL Ph.D. Thesis
Starley Lee Thompson 1983 177 p
Avail: Univ. Microfilms Order DA8308653

A numerical model of the atmospheric general circulation is developed and its results are compared to the predictions of several theories of meridional heat transport by transient baroclinic eddies. The model is based on the primitive equations and resolves the variable fields by zonal harmonics in longitude and by a discrete grid in latitude. In the standard configuration the model employs zonal wave-numbers 3 and 6 with vertical resolutions of 2, 6 or 10 layers. The model's physical processes are highly simplified compared to those incorporated in comprehensive general circulation models. The atmosphere is assumed to be dry and the surface flat and featureless. The model circulation is driven by diabatic heating determined from parameterizations of the net radiation at the top of the atmosphere. Simulations in which the meridional distribution of absorbed insolation is perturbed produce variations in eddy sensible heat transport roughly proportional to the changes in the meridional gradient of net radiation.
Dissert. Abstr.

N84-11651 Illinois Univ., Urbana-Champaign.
A NUMERICAL STUDY OF THE STRUCTURE AND VERTICAL TRANSPORT PROPERTIES OF A TROPICAL CONVECTIVE SYSTEM Ph.D. Thesis
Wei-Kuo Tao 1983 233 p
Avail: Univ. Microfilms Order No. DA8310015

Two- and three-dimensional numerical cloud ensembles models have been developed to study the collective response, statistical properties and formation of convective clouds. In the tropics, large-scale lifting is predominantly due to the destabilizing effect of large-scale lifting. Thus, a prescribed large-scale lifting is imposed continuously in the model. In order to initiate clouds, small amplitude random perturbations in the form of temperature fluctuations are also fed into the model at low level. The model allows clouds with various sizes to develop simultaneously inside the model domain. After run, horizontal and time averages of various relevant variables are computed to elucidate the statistical properties of the clouds. A case of well defined Intertropical Convergence Zone rainband during GATE, which approximates a two dimensional system, is chosen for this study. Dissert. Abstr.

N84-11652 Wisconsin Univ., Madison.
A CANDIDATE HYPOTHESIS FOR THE GENERATION OF QUASI-BIENNIAL VARIATIONS IN SEA LEVEL PRESSURE Ph.D. Thesis
Tamzy Janette House 1983 295 p
Avail: Univ. Microfilms Order No. DA8306680

For decades, it has been observed that various time seris of meteorological data exhibit quasi-biennial variations (QBV) that constitute a significant portion of the interannual variability demonstrated by the data. No physical casual mechanism has previously

been proposed that explains the local-to-global spatial scale, the persistence through time, and the numerous periodicities demonstrated by the QBV pnehomena. Any periodic phenomenon that is physically generated and stable through time has the potential to be a valuable predictive component in forecast models of interannual climate variability. Since the QBV phenomena are currently unexplained, this research effort proposes the hypothesis that the quasi-biennial variations seen in sea level pressure are induced by the modulation of the thermally induced annual cycle in sea level pressure by the soli-lunar gravitational tidal potential field. Nonlinear frequency interactions occurring between the annual thermal cycle and the various periodic partial tidal potential fields produced 20 fundamental QBV periodicities between 2 and 3 years. Dissert. Abstr.

N84-11653 Missouri Univ., Columbia.
A CLIMATOLOGY OF SYNOPTIC SCALE ATMOSPHERIC STRUCTURE PRIOR TO SEVERE CONVECTIVE STORMS Ph.D. Thesis
Gregory Eugene Taylor 1982 201 p
Avail: Univ. Microfilms Order No. DA8310431

Those unique properties of the thermodynamic and kinematic structure of the atmosphere in the region where tornado bearing thunderstorms develop as compared to surrounding locations. One hundred five upper air soundings from the operational rawinsonde network, hereafter called tornado proximity sounding, comprise the core of the data base. In each instance, a confirmed tornado occurred within 50 statute miles of and within 105 minutes after the release of the radiosonde. Measurements of the atmospheric structure near in space and time to the subsequent tornado bearing thunderstorm development were utilized. This fact should enhance the probability of detecting the presumably unique properties of the atmospheric structure prior to severe storm development. Height, temperature, mixing ratio, and U and V wind component data from the tornado proximity sounding station and surrounding upper air stations were objectively analyzed to a regularly spaced three dimensional grid network centered on the tornado proximity sounding station. Dissert. Abstr.

N84-11654 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS FROM THE GERMAN METEOROLOGICAL SERVICE. NUMBER 163: COMPARATIVE MEASUREMENTS WITH WIND SHIELDED AND UNSHIELDED RAIN GAGES [BERICHTE DES DEUTSCHEN WETTERDIENSTES, NR 162: VERGLEICHSMESSUNGEN MIT WINDGESCHUETZEN UND UNGESCHUETZTEN NIEDERSCHLAGSMESSGERAETEN]
Helmut Kumm 1983 46 p refs In GERMAN; ENGLISH summary
(Contract DFG-IHD-SB-74-su-40/20)
(ISBN-3-88148-203-2; ISSN-0072-4130) Copyright. Avail: Issuing Activity

Unshielded and wind shielded rain gages were compared at 200 stations over 5 yr. The average difference of the daily precipitation amounts, recorded in parallel each day, were obtained as a function of month, form of precipitation, and wind speed during precipitation. By combining several stations with a similar characteristic measuring difference, a sufficiently large amount of data is compiled to serve as a basis for statistically safe statements on the average measuring difference as a function of the daily precipitation amounts. All quantities derived are provided with the estimated instability margins. Author (ESA)

N84-11655# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
APPLICATIONS OF FLUID MECHANICS TO METEOROLOGY [APLICACOES DA MECANICA DE FLUIDOS A METEOROLOGIA]
Marco Antonio Maringolo Lemes Aug. 1983 22 p refs In PORTUGUESE; ENGLISH summary Presented at the 6th Congr. Nacl. de Mat. Aplicada e Computacional no Inst. Tecnologico de Aeronautica, ITA, Sao Jose dos Campos, Brazil, 26-30 Sep. 1983
(INPE-2839-PRE/386) Avail: NTIS HC A02/MF A01

Some of the fundamental concepts necessary for the full understanding of the dynamics of large scale atmospheric motions are presented. The basic equations are derived and their classical approximations are discussed in some important meteorological applications. The problem of vertical coordinates is also considered as a prerequisite to numerical weather prediction. Author

N84-11656# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE SOUTHERN OSCILATION: OCEANIC-ATMOSPHERIC CIRCULATION CHANGES AND RELATED RAINFALL ANOMALIES
Vernon E. Kousky, Mary T. Kagano, and Iracema F. A. Cavalcanti Oct. 1983 38 p refs Submitted for publication
(INPE-2903-PRE/420) Avail: NTIS HC A03/MF A01

The climate anomolies associated with Southern Oscillation - El Nino (ENSO) events are highly persistent and nearly global in extent. The persistent nature of these events derives from strong coupling between atmosphere and ocean. Although the intial causes of the oscillation are unclear, once initiated, the Southern Oscillation (SO) follows a certain sequence of events with well-defined effects on rainfall over a large portion of the tropics and subtropics. Drought in Austrialia, Indonesia, India, West Africa and Northeastern Brazil as well as excessive rainfall in the central and eastern Pacific, Peru, Ecuador and Southern Brazil are all related to the SO. ENSO events are also associated with dramatic changes in the tropospheric flow pattern over a broad area of both hemispheres. Wintertime upper tropospheric subtropical jets are especially pronounced as are changes in the low level trade wind regime of both the South Pacific and South Atlantic Oceans. Mid-latitude blocking patterns are also more frequent in certain regions during ENSO events. Author

N84-11657# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PERIODICITIES IN THE RAINFALL PATTERNS OF DIFFERENT REGIONS IN INDIA
R. P. Kane Oct. 1983 23 p refs Submitted for publication
(INPE-2899-PRE/418) Avail: NTIS HC A02/MF A01

Monsoon rainfall time series in various regions in India were subjected to power spectrum analysis by the method of Maximum Entropy Spectral Analysis (MESA). Significant periodicities of 2.3 years, 2.7 years etc. were observed but were not all the same for all subdivisions. Also, periodicities differed for the first 50 years (1875-1924) and the last 46 years (1925-70). Some periodicities for some regions tally with similar periodicities in sunspot number and geomagnetic H component. Author

N84-11658*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATION OF THE LIENARD-WIECHERT SOLUTION TO A LIGHTNING RETURN STROKE MODEL
Robert Meneghini Aug. 1983 36 p refs
(NASA-TM-85082; NAS 1.15:85082) Avail: NTIS HC A03/MF A01 CSCL 04B

The electric and magnetic fields associated with the lightning return stroke are expressed as a convolution of the current waveform shape and the fields generated by a moving charge of amplitude one (i.e., the Lienard-Wiechert solution for a unit charge). The representation can be used to compute the fields produced by a current waveform of non-uniform velocity that propagates along a filament of arbitrary, but finite, curvature. To study numerically the effects of linear charge acceleration and channel curvature two simple channel models are used: the linear and the hyperbolic. Author

N84-11659*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FORECASTING TROPICAL CYCLONE RECURVATURE WITH UPPER TROPOSPHERIC WINDS
R. Cecil Gentry (Clemson Univ.) Nov. 1983 26 p refs
(NASA-TM-85114; NAS 1.15:85114) Avail: NTIS HC A03/MF A01 CSCL 04B

Data from 17 tropical cyclones during the 1974 through 1979 hurricane seasons are used to investigate whether the high level winds far to the northwest, north and northeast of the hurricane center can be used to predict hurricane track recurvature. When the man 200-mb winds 1500 to 2000 km northwest and north of the storm center equal or exceed 20 m/s, 80 per cent of the storms recurved before traveling as much as 12 degrees of longitude farther west. The high winds were also used to predict change in direction of forward motion during the next 72 hours. The regression equations developed explain up to 41 per cent of the variance in future direction. In addition to the geostrophic winds used, winds were also obtained by tracking clouds with successive satellite imagery. The u-components of the satellite winds are highly correlated with the geostrophic winds at 200-mb and could probably be used instead of them when available. The v-components are less highly correlated. Author

N84-11660# World Meteorological Organization, Geneva (Switzerland).
COMPOSITION OF THE WMO
Jul. 1983 113 p In ENGLISH and FRENCH
(WMO-5) Avail: NTIS MF A01; HC available at WMO, Geneva

The names and addresses of WMO members are listed. Executive council, regional associations, and technical commissions (basic systems; instruments and methods of observation; atmospheric sciences; aeronautical meteorology; agricultural meteorology; marine meteorology; hydrology; and climatology and applications of meteorology) are covered. Author (ESA)

N84-11661# Range Commanders Council, White Sands Missile Range, N. Mex. Meteorology Group.
RANGE REFERENCE ATMOSPHERE 0-70Km ALTITUDE, WALLOPS ISLAND, VIRGINIA
Jul. 1983 214 p refs
(AD-A131327; RCC/MG-364-83) Avail: NTIS HC A10/MF A01 CSCL 04/2

The RRA contains tabulations for monthly and annual means, standard deviations, and skewness coefficients for windspeed, pressure, temperature, density, water vapor pressure, virtual temperature, and dewpoint temperature; the means and standard deviations for the zonal (U) and meridional (V) wind components; and the linear (product moment) correlation coefficient between the wind components. These statistical parameters are tabulated at the station elevation, at 1-km intervals from sea level to 30 km, and at 2-km intervals from 30 to 90 km. The wind statistics are given at approximately 10 m above the station elevations and at altitudes with respect to mean sea level thereafter. For those range sites without rocketsonde measurements, the RRAs terminate at 30 km altitude, or they are extended, if required, when rocketsonde data from a nearby launch site are available. There are four sets of tables for each of the 12 monthly reference periods and the annual reference period. GRA

N84-11662# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. ALTUS AFB, OKLAHOMA Final Report
Jun. 1983 491 p Supersedes USAFETAC/DS-79/056
(AD-A131613; AD-E850402; USAFETAC/DS-83/024; USAFETAC/DS-79/056) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Altus AFB, Oklahoma. It contains the following parts: (a) Weather conditions; atmospheric phenomena; (b) Precipitation, snowfall and snow depth (daily amounts and extreme values); (c) Surface winds; (d) Ceiling versus visibility; sky cover; (e) Psychrometric summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet-bulb and dew point temperatures and relative humidity); and (f) Pressure summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11663# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. BRIZE NORTON RAF, UNITED KINGDOM Final Report
May 1983 385 p
(AD-A131621; AD-E850392; USAFETAC/DS-83/014) Avail: NTIS HC A17/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Brize Norton raf, United Kingdom. It contains the following parts: (1) Weather conditions; Atmospheric phenomena; (2) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (3) Surface winds; (4) Ceiling versus visibility; sky cover; (5) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (6) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11664# Range Commanders Council, White Sands Missile Range, N. Mex. Meteorology Group.
DUGWAY, UTAH RANGE REFERENCE ATMOSPHERE 0-30 Km ALTITUDE
Jun. 1983 179 p refs
(AD-A131110; RCC/MG-363-83) Avail: NTIS HC A09/MF A01 CSCL 04/2

Using the best available upper atmosphere data base to include rawinsonde, rocketsonde and possibly other high-altitude data sources for the range location, the task is to establish a model of certain statistics for wind and thermodynamic quantities derived in a uniform manner and published in a standardized format. GRA

N84-11665# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. GRISSOM AFB, INDIANA Final Report
Jul. 1983 445 p Supersedes USAFETAC/DS-79/114
(AD-A131198; AD-E850404; USAFETAC/DS-83/026; USAFETAC/DS-79/114) Avail: NTIS HC A19/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Grissom AFB, Indiana. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11666# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. BLYTHEVILLE AFB, ARKANSAS Final Report
Jun. 1983 475 p Supersedes USAFETAC/DS-79/054

(AD-A131197; AD-E850403; USAFETAC/DS-83/025; USAFETAC/DS-79/054) Avail: NTIS HC A20/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Blytheville AFB, Arkansas. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11667# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. ELLSWORTH AFB, RAPID CITY, SOUTH DAKOTA Final Report
Jun. 1983 504 p Supersedes USAFETAC/DS-78/005
(AD-A131196; AD-E850401; USAFETAC/DS-83/022; USAFETAC/DS-78/005) Avail: NTIS HC A22/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Ellsworth AFB, South Dakota. It contains the following parts: (A) Weather Conditions; Atmospheric Phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface Winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11668# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. INDIAN MOUNTAIN AFS, ALASKA Final Report
Jun. 1983 525 p
(AD-A131195; AD-E850400; USAFETAC/DS-83/023) Avail: NTIS HC A22/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Indian Mountain, Alaska. It contains the following parts: (A) Weather Conditions; Atmospheric Phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface Winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11669# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. CARSWELL AFB, TEXAS Final Report
May 1983 475 p
(AD-A131193; AD-E850398; USAFETAC/DS-83/020; USAFETAC/DS-79/115) Avail: NTIS HC A20/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Carswell Air Force Base, Texas. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11670# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. CAPE NEWENHAM AFS, ALASKA Final Report
Apr. 1983 485 p
(AD-A131192; AD-E850397; USAFETAC/DS-83/019) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Cape Newenham AFS, Alaska. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11671# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. TIN CITY AFS, ALASKA Final Report
Apr. 1983 475 p
(AD-A131191; AD-E850395; USAFETAC/DS-83/017) Avail: NTIS HC A20/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Tin City AFS, Alaska. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11672# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. WERTHEIM AAF, WEST GERMANY Final Report

Feb. 1983 187 p
(AD-A131190; AD-E850394; USAFETAC/DS-83/016) Avail: NTIS HC A09/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Wertheim AAF, West Germany. It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11673# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F. LORING AFB, MAINE Final Report
Mar. 1983 465 p Supersedes USAFETAC/DS-81/074
(AD-A131189; AD-E850393; USAFETAC/DS-83/015; USAFETAC/DS-81/074) Avail: NTIS HC A20/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Loring AFB, Maine. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface winds; (D) Ceiling versus visibility; sky cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11674# Air Force Environmental Technical Applications Center, Scott AFB, Ill. Data Processing Div.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A, C, AND D. FEUCHT AAF, WEST GERMANY Final Report
May 1983 231 p Supersedes USAFETAC/DS-80/037
(AD-A131188; AD-E850390; USAFETAC/DS-83/012; USAFETAC/DS-80/037) Avail: NTIS HC A11/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Feucht AAF, Germany (West). It contains the following parts: (A)Weather conditions; Atmospheric phenomena; (B)Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C)Surface winds; (D)Ceiling versus visibility; sky cover; (E)Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F)Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N84-11675# Systems and Applied Sciences Corp., Riverdale, Md.
OBJECTIVE ANALYSIS AND PREDICTION TECHNIQUES Report, 25 Nov. 1981 - 30 Nov. 1982
Alan M. Gerlach 30 Nov. 1982 244 p
(Contract F19628-82-C-0023; AF Proj. 6670)
(AD-A131465; SCIENTIFIC-2; AFGL-TR-82-0394) Avail: NTIS HC A11/MF A01 CSCL 04/2

This report summarizes weather research conducted by SASC in several technical areas: in numerical weather prediction, objective analysis, initialization, and global moisture distribution; in mesoscale forecasting, McIDAS-based objective analysis and interactive forecast aids and displays; in boundary studies, specialized computer programs for sensor evaluation and data processing; in radar meteorology, evaluation of storm tracking algorithms, development of techniques for wind retrieval and relative storm motions; in satellite meteorology, application of McIDAS data to specification of weather elements. Author (GRA)

N84-11676# Pacific Northwest Lab., Richland, Wash.
TEST APPLICATION OF A SEMI-OBJECTIVE APPROACH TO WIND FORECASTING FOR WIND-ENERGY APPLICATIONS
H. L. Wegley and W. J. Formica Jul. 1983 99 p refs
(Contract DE-AC06-76RL-01830)
(DE83-016641; PNL-4403) Avail: NTIS HC A05/MF A01

The test application of the semi-objective (S-O) wind forecasting technique at three locations is described. The forecasting sites are described as well as site specific forecasting procedures. Verification of the S-O wind forecasts is presented, and the observed verification results are interpreted. Comparisons are made between S-O wind forecasting accuracy and that of two previous forecasting efforts that used subjective wind forecasts and model output statistics. DOE

N84-11677# Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
CLIMATIC RECONSTRUCTIONS IN THE NORTH AMERICAN ARCTIC DURING THE LAST 6000 YEARS
J. T. Andrews and S. K. Short 11 Jul. 1983 23 p refs
(Contract W-7405-eng-48; Grant NSF ATM-82-08677)
(DE83-015836; UCRL-15542) Avail: NTIS HC A02/MF A01

A data base of modern surface pollen samples from across the eastern and central Canadian arctic as well as along the North Slope of Alaska was built. Changes in the pollen spectra at a series of peat and lake sites in northern Labrador, Baffin Island, and Keewatin were documented. A series of transfer functions that relate modern climatic data to modern surface pollen spectra was prepared and the equations applied to fossil pollen spectra in the eastern Canadian arctic. The significance of spikes of exotic and shrub pollen in high arctic peat and lake samples as paleoclimatic indicators is discussed. DOE

N84-11678# Nevada Univ., Reno. Center for Water Resources Research.
A PRELIMINARY ANALYSIS OF PRECIPITATION IN SOUTHERN NEVADA
Richard H. French Apr. 1983 48 p refs
(Contract DE-AC08-81NV-10162)
(DE83-016648; DOE/NV-10162-10) Avail: NTIS HC A03/MF A01

The distribution of precipitation in both time and space in the southern Nevada area is examined. It is concluded that this area can be divided into two zones of precipitation separated by a transition zone on the basis of annual average precipitation. One region, relative to the other area, is defined to be a deficit annual average precipitation region. This observation could have a significant impact on groundwater recharge estimates and on the siting of facilities which must be protected from flash floods. In addition, precipitation records at three stations in the southern Nevada area were examined and point intensity/duration relationships were derived for these stations. DOE

N84-11679# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE FOURTH SESSION OF THE JOINT SCIENTIFIC COMMITTEE World Climate Research Programme
1983 159 p refs Conf. held at Venice, 1-8 Mar. 1983 Prepared

in cooperation with ICSU, Rome
Avail: NTIS MF A01; HC available at WMO, Geneva

The overall plan for the World Climate Research Program was reviewed. The climate data base was discussed. Land-atmosphere processes were considered. Ocean and sea ice research was summarized. Radiation processes; the Monsoon Climate program; climate models; and GARP were treated.
Author (ESA)

N84-11680# Systems Applications, Inc., San Rafael, Calif.
STATISTICAL CORRELATIONS OF SURFACE WIND DATA: A COMPARISON BETWEEN A NATIONAL WEATHER SERVICE STATION AND A NEARBY AEROMETRIC NETWORK Final Report
John E. Langstaff, Anthony D. Thrall, and Mei-Kao Liu Jul. 1983 151 p refs Prepared in cooperation with Lockheed Engineering and Management Services Co., Inc., Las Vegas, Nev.
(Contract EPA-68-03-3050)
(PB83-237263; EPA-600/4-83-035) Avail: NTIS HC A08/MF A01 CSCL 04B

This report presents a statistical analysis of wind data collected at a network of stations in the Southeast Ohio River Valley. The purpose of this study is to determine the extent to which wind measurements made by the National Weather Service (NWS) station at the Tri-State Airport can be used to estimate the wind measurements at the network stations. A combined stratification/regression analysis was conducted. The authors show that NWS station measurements can be used to gain an insight into the wind measurements at network stations. The authors demonstrate that the wind data collected at the airport can be used to provide input to a complex-terrain wind model for estimating the surface wind in the study area for periods prior to the establishment of the monitoring network. GRA

N84-11681# National Center for Atmospheric Research, Boulder, Colo.
THE MECHANISM OF METEOROLOGICAL NOISE
K. Hinkelmann Jul. 1983 35 p Transl. into ENGLISH from Tellus (Sweden), no. 3, 1951 p 285-296
(PB83-241489; NCAR/TN-203) Avail: NTIS HC A03/MF A01 CSCL 04B

Using a simple atmospheric model, the difference between the solutions of the primitive and the quasi-hydrostatic equations is demonstrated. The results show that the quasi-hydrostatic processes are largely determined by the initial field of pressure wherever the meteorological 'noise'-phenomena (in the form of short-period oscillations about a trend of the meteorological elements) depend on the initial field of the non-geostrophic wind components. This trend can be computed with sufficient accuracy also by a numerical integration of the primitive equations, which are mathematically simpler to handle than the quasi-hydrostatic equations. Author (GRA)

N84-11535# Bonn Univ. (West Germany). Inst. fuer Geodaesie.
MODERN HYGROMETER. IS IT AN ALTERNATIVE TO PSYCHROMETRIC HUMIDITY MEASUREMENT? [MODERNE HYGROMETER. EINE ALTERNATIVE ZUR PSYCHROMETRISCHEN FEUCHTEMESSUNG?]
W. Schauerte *In its* Studies of Satellite Geodesy, Very Long Baseline Interferometry (VLBI) and Geodetic Meas. Tech. 1982 p 81-107 refs In GERMAN (For primary document see N84-11528 02-42)
Avail: NTIS HC A08/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N84-11682 Texas A&M Univ., College Station.
ON SURFACE CIRCULATION OF THE EASTERN NORTH PACIFIC Ph.D. Thesis
Denise Ellen Hagan 1982 299 p refs
Avail: Univ. Microfilms Order No. DA8306776

A qualitative and statistical study of the trajectory data for 51 satellite-reporting, drogued drifters in the Eastern North Pacific has shown that there are distinct seasonal differences in the patterns of surface flow. The drift observations extend across the region 30 to 55 N, 170 to 130 W from June, 1976 through October, 1978, a period characterized by anomalous intensities and locations for the North Pacific high and Aleutian low atmospheric pressure cells. Composite and seasonal trajectory descriptions indicate that the large scale flow field had a stronger northward component in the winter of 1976 to 77 than in the following winter of 1977 to 78. Cluster analyses demonstrate high coherence and north-south symmetry in the flow system. Mesoscale eddy features are prevalent in summer and well-defined anticyclonic meanders are shown to persist at more southern latitudes and to dampen at more northern latitudes. Dissert. Abstr.

N84-11683 Texas A&M Univ., College Station.
MARINE MANGANESE ACCRETIONS: NODULE MICRONODULE COMPARISONS AMONG MAJOR OCEAN BASINS Ph.D. Thesis
Leo Allen Barnard 1982 291 p
Avail: Univ. Microfilms Order No. DA8306757

Stable oscillatory reaction waves are proposed as a model for the formation of alternate Mn-rich and Fe-rich laminae in marine manganese accretions. High resolution electron microprobe traverses of coexisting nodules and micronodules from sediments of the Gulf of Mexico, FAMOUS (French American Mid-Ocean Undersea Survey) Area, Hatteras Abyssal Plain and Clarion-Clipperton Fracture Zone reveal an overall lamination pattern with 6 micron spacing. These layers are of variable density, elemental composition and crystal size. The oscillatory reaction model calls for the precipitation of undifferentiated, non-stoichiometric Mn + Fe oxyhydroxide as the initial phase. Subsequent reordering reduces and remobilizes manganese which diffuses outward. Reprecipitation of a Mn-rich layer occurs when the Mn encounters sufficient dissolved oxygen. The surface created may then become the substrate for more undifferentiated non-stoichiometric oxyhydroxide. Dissert. Abstr.

N84-11684*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REPORT OF THE FIRST NIMBUS-7 SMMR EXPERIMENT TEAM WORKSHOP
W. J. Campbell and P. Gloersen Aug. 1983 25 p refs Workshop held at Goddard Space Flight Center, Greenbelt, Md., 28-30 Oct. 1982
(NASA-TM-85093; NAS 1.15:85093) Avail: NTIS HC A02/MF A01 CSCL 08L

Preliminary results of sea ice and techniques for calculating sea ice concentration and multiyear fraction from the microwave radiances obtained from the Nimbus-7 SMMR were presented. From these results, it is evident that these groups used different and independent approaches in deriving sea ice emissivities and algorithms. This precluded precise comparisons of their results. A common set of sea ice emissivities were defined for all groups to use for subsequent more careful comparison of the results from the various sea ice parameter algorithms. To this end, three different geographical areas in two different time intervals were defined as typifying SMMR beam-filling conditions for first year sea ice, multiyear sea ice, and open water and to be used for determining the required microwave emissivities. Author

N84-11685# University of South Florida, St. Petersburg. Marine Science Inst.
OPTICAL MEANS OF MEASURING PARTICLE-SEA INTERACTIONS IN THE CARIBBEAN SEA AND GULF OF MEXICO Final Report, Jan. 1979 - Mar. 1983
K. L. Carder and R. G. Steward Apr. 1983 100 p refs
(Contract N00014-75-C-0539; RR0310301)
(AD-A131290) Avail: NTIS HC A05/MF A01 CSCL 08/3

A holographic image analysis system has been developed to

measure the position, velocity, size, and shape of microscopic particles slowly settling in three dimensional space. Images of particles recorded sequentially on individual holographic frames are reconstructed using an in-line, far field configuration. Image analysis is computer-controlled with two basic functions. First is the precision registration and XYZ positioning of the holographic frame so that accurate particle displacements between sequential frames can be measured. These displacements are compared to the elapsed time between the frames to get particle settling velocity. Second, it scans a digitized video image of the reconstructed holographic image to measure size, shape, and area. A scanning algorithm has been developed to determine particle size (area, length, width) for classification by settling characteristics. An edge tracking algorithm has also been developed to facilitate particle identification by shape from frame to frame. A cataloging system was developed to provide for data entry, storage and retrieval.
Author (GRA)

N84-11686# Naval Oceanographic Office, Bay St. Louis, Miss.
GEOPHYSICS AND TECTONIC DEVELOPMENT OF THE CAROLINE BASIN
Dewey R. Bracey May 1983 86 p refs
(AD-A131314; NOO-TR-283) Avail: NTIS HC A05/MF A01 CSCL 08/10

Contradictory hypotheses on the origin of the Caroline Basin suggested that an attempt be made to arrive at a reasonable synthesis of basin origin. This thesis attempts such a synthesis. The principal conclusions reached are that the Caroline Basin was formed by a complex sea floor spreading mechanism in Tertiary time behind a southward advancing island arc. Mantle plume development in the eastern basin during this time may have found the Eauripik Rise through blockade of westward axial mantle flow at a transform dam. Non-uniform cessation of spreading began in Upper Oligocene, together with the subduction of the southern portion of the ancestral ridge onto New Guinea, with concurrent northward subduction of basin crust at the southern base of the remnant northern ancestral ridge. An extensional trough opened in the northern ridge and expanded until collision with the eastward advancing Yap-Palau arc in Upper Miocene. Author (GRA)

N84-11687# Ocean Research Consultants, La Jolla, Calif.
LONG-TERM TRENDS IN DYNAMIC HEIGHT AND SEA SURFACE TEMPERATURE
T. P. Barnett Apr. 1983 47 p refs
(Contract W-7405-eng-48)
(DE83-014868; UCRL-15534) Avail: NTIS HC A03/MF A01

Secular changes in the density structure of the upper ocean are investigated to see if they can explain the apparent rise in sea level observed along the continental margins of the world's oceans. The time rate of change of dynamic height is estimated to be -0.8 dyn cm/cent, a value that is indistinguishable statistically from 0. Further, the distribution of individual values entering the grand average are distributed normally to high degree of approximation. Assuming the change in relative sea level is real, then it could be due to either melting of the polar caps or warming of the upper ocean. Warming, since the turn of the century, of the magnitude suggested in much of the literature would have been detectable in the density structure of the upper ocean. This signal was not seen in the current analysis. A more modest warming, allowing for instrumental biases over the last 50 years and/or melting of the polar caps by just enough to give the observed change in relative sea level would have signatures in the upper ocean density field that would barely be detectable in the current study. DOE

N84-11688# Oak Ridge National Lab., Tenn. Chemistry Div.
ROLE OF THE OCEANS IN THE CARBON CYCLE
C. F. Baes, Jr. 1982 37 p refs Presented at the Conf. on Climate and Energy: Carbon Dioxide, Erice (Italy), 16 Jul. 1982
(Contract W-7405-eng-26)
(DE83-015530; CONF-820794-1) Avail: NTIS HC A03/MF A01

The physical, chemical, and biological processes that determine the rate of CO2 takeup by the ocean are reviewed. It is shown how these processes determine the distribution of carbon between the ocean and atmosphere, and in the oceans themselves. Finally it is considered to what extent these processes should be represented in models intended to simulate the response of the oceans to increasing atmospheric CO2. DOE

N84-11689# Institute of Oceanographic Sciences, Wormley (England). Natural Environment Research Council.
GEOTECHNICAL PROPERTIES OF DEEP SEA SEDIMENTS: A CRITICAL REVIEW OF MEASUREMENT TECHNIQUES
P. J. Schultheiss 1982 75 p refs Sponsored by UK Dept. of Environment
(IOS-134) Avail: NTIS HC A04/MF A01

Techniques employed for assessing the geotechnical properties of deep sea sediments, and differences between terrestrial soils and ocean sediments are reviewed. The type of sample necessary for specific geotechnical tests and when in-situ tests need to be performed are discussed. Problems of obtaining relatively undisturbed samples from the sea bed, and parameters which cause disturbance, including the problems of large reductions in hydrostatic pressures, are considered. Apart from destructive mechanical tests, the use of nondestructive testing, especially acoustic, on samples and in situ is examined. It is concluded that, because all samples suffer a significant amount of disturbance, very few laboratory tests can have high levels of confidence. In-situ testing, while inherently expensive, can provide rapid and reliable answers providing that the tests are designed for specific purposes rather than attempting to use universal testing procedures. Author (ESA)

N84-11690# Institute of Oceanographic Sciences, Taunton (England). Natural Environment Research Council.
SIZEWELL-DUNWICH BANKS FIELD STUDY, TOPIC REPORT 7: A STUDY OF NEARSHORE SEDIMENT TRANSPORT PROCESS Final Report
B. J. Lees 1983 47 p refs Sponsored by UK Dept. of Environment
(IOS-146) Avail: NTIS HC A03/MF A01

The formation and development of an offshore bank, and the role of the bank in protecting the adjacent coastline are discussed. The variation of the suspended sediment transport rate as the friction velocity to the power 2.8 is noted. The occurrence of logarithmic near-bottom velocity profiles, in spite of the high concentration of suspended sediment is reported. The ratio of the eddy diffusitivity of suspended grains to the eddy viscosity of the fluid is > 1 : sediment particles actually diffuse faster than the particles of containing fluid. Wave height attenuation by a bank above a mean summer significant wave height, critical for specific water depths, and the ability to predict this theoretically, are demonstrated. Theories of sandbank formation and maintenance in the lee of a headland, due to vorticity and advective effects in the currents are supported. The use of fluorescently labelled tracer for bedload sediment transport measurements is advocated.
Author (ESA)

N84-11691# Institute of Oceanographic Sciences, Wormley (England). Natural Environment Research Council.
THE CTD DATA COLLECTED IN THE ROCKALL TROUGH ON RRS SHACKLETON CRUISE 5c/78 DURING JASIN 1978
D. S. Collins 1982 149 p refs
(IOS-147) Avail: NTIS HC A07/MF A01

Deep CTD profiles and shallow CTD yoyos made during multiship experiments are presented. Data processing procedures are described. Author (ESA)

N84-11692# Institute of Oceanographic Sciences, Wormley (England).
LONG SEASOAR CTD SECTIONS IN THE NORTHEAST ATLANTIC OCEAN COLLECTED DURING RRS DISCOVERY CRUISE 116
D. S. Collins, R. T. Pollard, and Suchen Pu (First Inst. of Oceanography, Shandong, China) 1983 79 p refs
(IOS-148) Avail: NTIS HC A05/MF A01

The CTD data collected in the northeast Atlantic Ocean between 46.7 N, 11.3 W and 36.1 N, 18.5 W are presented. The CTD unit was mounted in a SeaSoar vehicle which undulated between the sea surface and 300m depth once per km. The data comprise a vertical section of the top 300m over 1400 km long, spanning over 10 deg of latitude, and containing 1340 individual profiles. Methods of data processing and presentation on board ship and on land are described. Data consists of temperature/salinity plots and contoured sections. Author (ESA)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N84-11693# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 17, NO. 5, SEPTEMBER - OCTOBER 1983
O. G. Gazenbo, ed. 1 Nov. 1983 156 p refs Transl. into ENGLISH of Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep. - Oct. 1983 96 p
(JPRS-84655) Avail: NTIS HC A08

The effects of long term space flight are examined. Metabolism responses and the cardiovascular system are emphasized. Certification of pilots through medical examination is included. For individual titles, see N84-11694 through N84-11719.

N84-11694# Joint Publications Research Service, Arlington, Va.
STUDY OF CARDIOVASCULAR SYSTEM DURING LONG-TERM SPACEFLIGHTS **c52**
A. D. Yegorov and O. G. Itsekhovskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 1-5 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 4-6 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

During the Salyut-6 spaceflights cardiac bioelectrical and mechanical activity, blood content and tone of cerebral and limb vessels, systemic arterial and venous pressure were measured in 10 primary crewmembers. The measurements were taken at rest and during LBNP and ergometry tests. It is shown that the circulation changes are adaptive reactions of the body to a new environment, particularly weightlessness. Cardiovascular responses to the provocative tests were changed and more marked, probably, due to blood redistribution. Author

N84-11695# Joint Publications Research Service, Arlington, Va.
SIMULATION OF CEREBROCRANIAL TRAUMA FOR EVALUATION AND DEVELOPMENT OF GEAR TO PROTECT PILOTS AGAINST IMPACTS **c52**
A. S. Barer, V. I. Kharchenko, Yu. G. Konakhevich, L. N. Sholpo, G. N. Dubalskiy, V. Kh. Petlyuk, and N. A. Uglanova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 6-15 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 7-12 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The results of developing a model of craniocerebral trauma are presented. A man's head model was developed along with a criterion of impact safety. The model and the criterion can be used for experimental assessment of pilot's protective helmets. Author

N84-11696# Joint Publications Research Service, Arlington, Va.
AIRCRAFT CREW DIET IN EMERGENCY SITUATIONS **c54**
I. G. Popov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 16-31 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 12-24 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The problems of emergency rations for flight crews are surveyed. Limitations to providing adequate nutrition and water supply in emergency situations that meet the pilot's nutritional requirements are discussed. Methods of providing nutrition, maintaining metabolism and work capacity under the conditions of food and water shortage, and avoiding starvation and dehydration of the body are discussed. J.M.S.

N84-11697# Joint Publications Research Service, Arlington, Va.
CHANGES IN CARDIAC OUTPUT AND ORTHOSTATIC STABILITY OF COSMONAUTS **c52**
P. V. Vasilyev, A. D. Voskresenkiy, V. G. Doroshev, V. V. Kalinichenko, N. A. Lapshina, and V. V. Shchigolev *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 32-35 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 25-27 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Examinations of 14 cosmonauts who performed orbital flights of 14 to 175 days wwere used to correlate cardiac output (CO) inflight with orthostatic tolerance and ALBNP reactions postflight. In 3 crewmembers CO was lower than or close to the preflight level. In 4 cosmonauts CO was higher than preflight. The remaining 7 crewmembers showed lower orthostatic tolerance and stronger LBNP reactions. The difference between mean CO values before and during flight was in negative correlation with orthostatic tolerance ($r = -0.6$) and in positive correlation with LBNP reactions ($r = 0.7$). The correlation coefficients were derived from small samples but an identical relationship between the two different tests with inflight CO variations gives evidence that such a relationship actually exists. Author

N84-11698# Joint Publications Research Service, Arlington, Va.
HEMODYNAMIC REACTIONS TO POSITIVE INTRATHORACIC PRESSURE AT +G SUB Z ACCELERATIONS **c52**
M. A. Tikhonov, D. Yu. Arkhangelskiy, A. V. Kondakov, and V. V. Litovchenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 36-40 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 27-30 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Eight male test subjects, aged 20 to 28, were exposed to acceleration +Gz and positive breathing pressure (PBP) of 30 mm Hg to study their hemodynamics under these conditions. The calculated and experimental decrease of blood pressure at the eye level during increasing acceleration and voluntary myorelaxation was comparable. The exposure to PBP helped tolerate higher (by 1.1 + or - 0.2 G) acceleration values without visual disorders. The exposure to 7.0 G and PBP caused a lower increase in heart rate and breathing frequency (by 6% and 12%, respectively), a smaller reduction of blood pressure at the eye level (by 20%) and a decreased muscular tension (by 18%). Author

N84-11699# Joint Publications Research Service, Arlington, Va.
NORMAL HUMAN CORONARY CIRCULATION DURING POSTURAL TESTS AND DECOMPRESSION OF LOWER HALF OF BODY **c52**
V. Ye. Katkov, V. V. Chestukhin, V. V. Rumyantsev, Ye. V. Kolpakov, N. V. Pravetskiy, and S. V. Agafonov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 41-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 30-36 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The effect of postural changes (orthostatic and antiorthostatic tests) and LBNP on coronary circulation was investigated in 11 healthy male test subjects. Volume blood flow velocity and pressure were measured and blood flowing from the heart was withdrawn using a Ganz catheter implanted into the coronary sinus. A thin Teflon catheter was implanted into the brachial artery. When the test subjects were transferred from the recumbent to the head up position their left ventricular oxygen consumption decreased by 3.2 m/min (21%) and coronary blood flow by 23.8 m/min (19%), while coronary vascular resistance increased by 32%. When

the test subjects were transferred from the head up to the head down position (at -15 deg), coronary oxygen consumption and blood flow increased by 5.5 (46%) and 45.3 (44%) m/min, respectively, and coronary resistance decreased by 36%. In this situation the LBNP test (-30 mm Hg for 20 min) caused a reduction in oxygen consumption and coronary blood flow by 4.4 (25%) and 37.3 (25%) 7 m/min, respectively, and an increase in coronary resistance by 58%. Author

N84-11700# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF RHEOGRAPHIC PARAMETERS OF CEREBRAL CIRCULATION AND CIRCULATION IN THE EXTREMITIES DURING ACTIVE ORTHOSTATIC TEST **c52**
N. I. Sapova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 36-39 No. 5, Sep.-Oct. 1983 p 50-55 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Rheography was used to study brain, leg and forearm circulation in 30 male test subjects during tilt tests. In the head up position blood circulation in the above body parts decreased due to a reduction of stroke volume. The orthostatis reaction was considered normal, provided that leg blood content decreased and tone increased, cerebral and forearm blood content and tone varied slightly, and rheographic parameters in the stationary states (lying and standing) remained unchanged. Author

N84-11701# Joint Publications Research Service, Arlington, Va.
EFFECT OF REDISTRIBUTION OF BLOOD ON SEVERITY OF SPATIAL POSITION ILLUSIONS IN WEIGHTLESSNESS **c52**
F. A. Solodovnik, A. V. Chapayev, A. A. Prusskiy, and A. A. Simakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 56-60 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 40-43 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Blood redistribution was produced using a tilt table (-30 deg) and a LBNP device. Illusionary sensations were measured by a Birtok unit and subjective reports of the test subjects. In the head down position the feeling of blood rush to the head disappeared as soon as the weightless state was reached. In most cases illusionary sensations were similar to those in the horizontal position. When exposed to LBNP tests, the subjects developed no illusionary sensations during horizontal flight and felt their upper body going upwards and legs going downwards in the weightless state. Thus, illusionary sensations of the spatial position depend at large on blood redistribution in the human body. Author

N84-11702# Joint Publications Research Service, Arlington, Va.
FREE AMINO ACIDS OF BLOOD BEFORE AND AFTER SHORT-TERM SPACEFLIGHTS **c52**
T. F. Vlasova, Ye. B. Miroshnikova, and A. S. Ushakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 61-63 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 43-45 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The amino acid composition of plasma and serum of the crewmembers who performed short term flights (of 3 to 14 days) onboard the Salyut-6 orbital station was investigated. Immediately postflight total amino acids remained unchanged while variations in isolated amino acids (tendency toward increased aspartic acid and decreased crystein in plasma, and increased leucin in serum) were adaptive. Author

N84-11703# Joint Publications Research Service, Arlington, Va.
CHANGES IN BLOOD UREA CONTENT UNDER HYPOKINETIC CONDITIONS **c52**
I. S. Balakhovskiy and T. A. Orlova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 64-69 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 45-48 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The blood and urine content of urea and creatinine, as well as urea production and creatinine clearance were measured in 9 test subjects exposed to head-down tilting (at -6 deg) for 8 days. The trend for an increased urea content was more marked in the test subjects with its initially low concentration (3.3-4.2 mmol/l). Variations in the urea concentration were similar and included its decrease during the first day and increase thereafter. Creatinine excretion and clearance declined uniformly and significantly during the first 5 experimental days. No correlation was found between urea concentration and urea production, or between creatinine clearance and urea concentration. Author

N84-11704# Joint Publications Research Service, Arlington, Va.
ENERGY METALBOLISM ENZYMES IN SIMULATION OF SOME SPACEFLIGHT FACTORS **c52**
S. Kalandarov, V. P. Bychkov, I. D. Frenkel, L. P. Volkova, and G. I. Proskurova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 70-73 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 49-51 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The content of lactate dehydrogenase, amino transferases and creatine kinase was measured in the test subjects of three age groups (41 to 50, 50 to 57 and 26 to 33 years) exposed to head-down tilt, linear acceleration, exercise, and emotional stress. The enzyme activity increased in response to head-down tilt, acceleration and exercise. The enzyme content normalized under the influence of selected nutrients. Author

N84-11705# Joint Publications Research Service, Arlington, Va.
MORPHOMETRIC STUDY OF RAT ADRENAL MEDULLA DURING LONG-TERM HYPOKINESIA
A. S. Pankova and Ye. A. Savina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 74-79 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 51-54 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Using Wood's differential staining, norepinephrine- and epinephrine-secreting cells of the adrenal medulla of 36 Wistar male rats exposed to 1 to 5.5-month hypokinesia were measured caryometrically. After 2 month hypokinesia the nuclear volume of norepinephrine-secreting cells increased significantly. After 5.5-month hypokinesia no dystrophic changes were seen in the adrenal medulla. Author

N84-11706# Joint Publications Research Service, Arlington, Va.
EFFECT OF ELEUTEROCOCCUS EXTRACT ON RECOVERY PROCESSES IN RATS FOLLOWING SEVEN-DAY HYPOKINESIA
E. I. Khasina, I. V. Dardymov, and I. I. Brekhman *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 81-84 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 55-58 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Rats were housed in small cages for 7 days and then were placed into regular cages. The hypokinetic animals lagged behind the controls in their weight gain and reached their normal weight 45 days after the exposure. The hypokinetic exposure stimulated the pituitary-adrenal system, the effect being most pronounced during the first 12 h after the experiment. The hypokinetic effect decreased the glycogen content and the hexokinase and glucose-6-phosphate dehydrogenase activity and increased lactate dehydrogenase and phosphoenol pyruvate carboxykinase activity. The parameters examined returned to normal 45 days after the experiment. The eleuterococcus preparation, the administration of which began immediately after the exposure, expedited the normalization of the parameters almost twofold (by day 20). Author

N84-11707# Joint Publications Research Service, Arlington, Va.
EFFECT OF HYPOKINESIA ON AMINO ACID METABOLISM IN RATS ON DIETS DIFFERING IN CALCIUM AND PHOSPHORUS CONTENT
T. F. Vlasova and Ye. B. Miroshnikova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 89-95 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 58-60 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The effect of hypokinesia on amino acid metabolism was studied in rats kept on diets with different ratios of calcium and phosphorus. It was shown that excessive phosphorus in the diet led to a significant decrease of the amino acid pool, thus aggravating the hypokinetic effect. Author

N84-11708# Joint Publications Research Service, Arlington, Va.
DEMONSTRATION OF GAS BUBBLES IN CANINE PULMONARY ARTERY AND AORTA BY MEANS OF ULTRASONIC ECHOGRAPHY WITH INTRAVENOUS AIR INFUSION
V. P. Nikolayev, V. P. Katuntsev, R. T. Kazakova, R. I. Finogenova, K. S. Yurova, T. D. Doronina, A. D. Mansfeld, P. K. Chichagov, and A. M. Reyman *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 89-95 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 61-65 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The transducer and receiving amplifier of a standard ultrasonic echocardiograph were modified to develop a device for detecting unmasked echocardiographic images of gas bubbles in blood vessels. This device was employed to detect gas bubbles passing from the venous to the arterial bed via lungs in anesthesized and thoracotomized dogs during air intravenous infusion. Gas bubbles entered the aorta when the dose of infused air was 12 to 15 ml. It is postulated that gas bubbles formed in the animal and human body during decompression may pass from the venous into the arterial bed not only through shunts but also through lung capillaries. Author

N84-11709# Joint Publications Research Service, Arlington, Va.
PHYSIOLOGICAL AND ECOLOGICAL CHARACTERISTICS OF THE WATER FERN, AZOLLA PINNATA, AND PROSPECTS OF USING IT IN BIOLOGICAL LIFE-SUPPORT SYSTEM FOR MAN **c54**
Ye. Ya. Shepelev, Nguen Thyok, G. I. Meleshko, A. A. Antonyan, T. B. Galkina, and V. P. Naydina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 96-101 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 66-69 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The principal physiological and ecological characteristics of Azolla pinnata were investigated in order to determine its potential use in biological life support systems. Plant requirements for biogenic elements were specified in order to develop balanced nutrient mixtures for continuous cultivation. Data on the growth and development, photosynthetic and nitrogen fixation rate, and biochemical composition of the plant were obtained for optimal cultivation conditions. The plant biomass contains large quantities of carotenoids and sulfur-containing amino acids, which are deficient in unicellular algae. This makes Azolla an attractive source of the above compounds for biological life support systems and other applications. Author

N84-11710# Joint Publications Research Service, Arlington, Va.
PREDICTION OF VOMITING IN DOGS EXPOSED TO RADIATION WITH SHIELDING OF MIDABDOMEN
T. F. Osokina, B. L. Razgovorov, and B. I. Davydov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 102-105 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 70-72 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Data on vomiting as a primary dose-dependent reaction of dogs to irradiation are presented. It is shown that vomiting can be predicted with reference to the average absorbed dose in the abdominal area, provided the animal is irradiated in a lethal dose and the area is shielded. It is emphasized that calculated and experimental data are in good agreement. Author

N84-11711# Joint Publications Research Service, Arlington, Va.
CONDITION OF ERYTHROCYTES DURING LONG-TERM EXPOSURE TO MAGNETIC FIELD
G. V. Cherkasov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 106-110 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 72-75 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

During and after exposure to a constant magnetic field of 1.6 T mice showed variations in the size distribution to red blood cells, with their shape remaining unchanged and enlarged cells being predominant. This shift persisted till exposure day 10 and began to return to normal on days 15, 22 and 30. After irradiation the Price-Jones curve varied in a different manner and recovered by day 6. The changes in the curve were not correlated with variations in the reticulocyte and erythrocyte counts or hemoglobin content. It is concluded that an exposure to a constant magnetic field produces insignificant lesions in the red blood cell membrane. Mention should be made of a reduction of the reticulocyte count in the peripheral blood after exposure. Author

N84-11712# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL PSYCHOLOGICAL METHODS USED IN EXPERT EVALUATION OF MENTAL WORK CAPACITY OF FLIGHT PERSONNEL IN THE PRESENCE OF FUNCTIONAL DISTURBANCES AND CENTRAL NERVOUS SYSTEM DISEASES **c52**
I. N. Lavrentyeva, V. I. Myasnikov, and V. F. Volokhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 111-116 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 76-80 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The mental state and work capacity of flight personnel with functional central nervous system disturbances were examined on the basis of assessing the professionally relevant traits and properties. Some elements of a pilot's task performance were simulated. J.M.S.

N84-11713# Joint Publications Research Service, Arlington, Va.
OBJECTIVIZATION OF EVALUATION OF SPEECH INTELLIGIBILITY DURING FLIGHTS **c32**
M. V. Frolov, O. A. Cherkasov, G. I. Tarasenko, and I. A. Petlenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 117-120 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 80-81 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Results of monitoring speech by an auditor and checking parameters of the articular trust of the speaker are analyzed to find a reliable and affective means of evaluating intelligibility of speech. The affect of a mask on syllable intelligibility was tested. J.M.S.

N84-11714# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF A SUBJECTS CONDITION ACCORDING TO PITCH OF THE VOCAL VOWEL 'A' **c52**
G. I. Akinshchikova and O. D. Volchek *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 121-123 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 82-83 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The phonation of 'A' by more than 200 individuals was recorded

under different conditions. Several psychophysiological parameters were also recorded. Correlation analysis of the results identified a close link between magnitude of PVV" PVV'A' and values of the psychophysiological parameters. The e level of significance constituted P = 0.01 to 0.001. J.M.S.

N84-11715# Joint Publications Research Service, Arlington, Va.
METHOD FOR ASSESSING MENTAL STRESS IN OPERATORS **c53**

B. N. Ryzhov and V. P. Salnitskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 124-126 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 83-84 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The method of combining different parameters into an integral evaluation of stress is tested. The validity of the method was determined in the first series of studies by finding coefficients of correlation between parameters of tension and rate of delivery of information to the operator. Investigation of parameters of productivity of operator work, distinctions of their reactions during work, as well as their own accounts enable us to demonstrate a rather high discriminatory sensitivity of the integral rating for qualitatively dissimilar types of mental tension that are inherent in the types of operator work in question. J.M.S.

N84-11716# Joint Publications Research Service, Arlington, Va.
A METHOD OF ASSESSING CARDIAC FUNCTION WITH BICYCLE ERGOMETRY IN EXPERT MEDICAL CERTIFICATION OF PILOTS **c52**

E. G. Mukhamedov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 127-130 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 84-86 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The functional state of the myocardium was examined using bicycle ergometry, taking into consideration maximum blood pressure and duration of electrical systole as the most efficient period of the cardiac cycle. The results indicate that, in the presence of early signs of atherosclerosis with adequate myocardial coronary reserve, the proposed parameter 'systolic product' could be used as an additional criterion for assessing the functional state of the cardiovascular system in the practice of expert medical certification of flight personnel. J.M.S.

N84-11717# Joint Publications Research Service, Arlington, Va.
EVALUATION OF SKELETAL MUSCLE TONE BY RECORDING LATERAL RIGIDITY **c52**

G. I. Gevlich, L. S. Grigoryeva, M. I. Boyko, and I. B. Kozlovskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 131-137 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 86-89 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

The method of assessing muscle tone according to parameters of lateral rigidity is described. The electromyotonometer was used to record the force of application of the gage and tissular reaction over a wide range of strain energy. The findings indicate that when recording the forte of application of the gage and tissue reactions with standardization of position and level of muscular activity, the described method makes it possible to assess with adequate precision and reproducibility the lateral rigidity of muscles. It can be used in experiments and clinical practice as a means of quantitative evaluation of muscle tone. J.M.S.

N84-11718# Joint Publications Research Service, Arlington, Va.
METHOD FOR IDENTIFYING TRACE CONTAMINANTS IN CHAMBER ATMOSPHERE AT HIGH PRESSURE **c54**

B. L. Avetisyants, O. A. Sukhorukov, O. N. Skalatskiy, and L. B. Zhukova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 138-141 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 90-91 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

Methods for collection, concentration, and chromatographic analysis of trace contaminants in an artificial atmosphere at elevated pressure are described. Three different methods are used to collect and concentrate trace contaminants from the atmosphere at the working pressure in the chamber: system of cryogenic traps cooled by liquid air; passing samples through adsorption traps; use of adsorption traps without pumping (with diffusion delivery of substances to be analyzed). J.M.S.

N84-11719# Joint Publications Research Service, Arlington, Va.
DEVICE FOR GRADED EXERCISING OF RATS IN PRESSURE CHAMBER **c35**

K. S. Yurova and V. M. Potabenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 142-146 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 91-94 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

A device was developed that would permit rapid immersion of animals into water in order to exercise (swim) at different stages of high pressure and to remove them from water just as rapidly without lowering pressure in the chamber. This device permits investigation of metabolic processes, enzyme activity and the role of the adrenosympathetic system in swimming animals. J.M.S.

N84-11720*# Texas Univ., Austin. Dept. of Botany.
THE REGULATORY FUNCTIONS OF CALCIUM AND THE POTENTIAL ROLE OF CALCIUM IN MEDIATING GRAVITATIONAL RESPONSES IN CELLS AND TISSUES

Stanley J. Roux, ed. Nov. 1983 295 p refs Workshop held in Bethesda, Md., 16-18 Sep. 1982
(Grant NsG-7480)
(NASA-CP-2286; NAS 1.55:2286) Avail: NTIS HC A13/MF A01 CSCL 06B

The hypothesis that calcium plays an important part in regulating cellular response to gravity and to other environmental stimuli is explored. Topics covered include the role of calmodulin and other proteins, gravitropic responses, bone demineralization during space flight, and intracellular communication. For individual titles, see N84-11721 through N84-11739.

N84-11721*# Texas Univ., Austin. Dept. of Botany.
EVIDENCE FOR A REGULATORY ROLE OF CALCIUM IN GRAVITROPISM

Stanley J. Roux *In its* The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 2-13 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Experiments conducted to determine the cellular basis of gravitropism, the phenomenon of calcium migration following gravitropic stimulation, and the preferential accumulation of calcium in cells are described. Results of autoradiographic studies of cross sections of oat, and the pryoantimony precipitation of calcium in situ are discussed. It was found that the movement of calcium during gravimetric stimulation is a redistribution of calcium from the vacuolar regions into the cells walls. This movement requires precipitation of a calcium ATPase. The control of calcium ATPase by calmodulin and whether chlorpromazine is binding to calmodulin in plants are considered. A.R.H.

N84-11722*# Massachusetts Univ., Amherst. Dept. of Botany.
CALCIUM AND MITOSIS

Peter Hepler *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 14-27 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Although the mechanism of calcium regulation is not under-

stood, there is evidence that calcium plays a role in mitosis. Experiments conducted show that: (1) the spindle apparatus contains a highly developed membrane system that has many characteristics of sarcoplasmic reticulum of muscle; (2) this membrane system contains calcium; and (3) there are ionic fluxes occurring during mitosis which can be seen by a variety of fluorescence probes. Whether the process of mitosis can be modulated by experimentally modulating calcium is discussed. A.R.H.

N84-11723*# Agricultural Research Center, Beltsville, Md. Plant Stress Lab.
CALCIUM MODULATION OF PLANT PLASMA MEMBRANE-BOUND ATPASE ACTIVITIES
Charles Caldwell *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 28-43 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The kinetic properties of barley enzyme are discussed and compared with those of other plants. Possibilities for calcium transport in the plasma membrane by proton pump and ATPase-dependent calcium pumps are explored. Topics covered include the ph phase of the enzyme; high affinity of barley for calcium; temperature dependence, activation enthalpy, and the types of ATPase catalytic sites. Attention is given to lipids which are both screened and bound by calcium. Studies show that barley has a calmodulin activated ATPase that is found in the presence of magnesium and calcium. A.R.H.

N84-11724*# Vanderbilt Univ., Nashville, Tenn.
INTRACELLULAR CALCIUM RECEPTORS: CALMODULIN AND RELATED PROTEINS
D. Martin Watterson *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 44-56 (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Studies on intracellular calcium receptors, calmodulin and related proteins were carried out. Calcium binding proteins, like calmodulin fall into a class of proteins that are predominantly intracellular and reversibly bind calcium with dissociation constants in the micromolar to nanomolar range. Calcium regulation of these proteins appears to be due to localized increases in calcium concentrations in the cytoplasm. The main thrust of the research is concerned with purifying and characterizing the calcium receptors and trying to elucidate mechanistically how they are involved in cellular responses. B.W.

N84-11725*# Georgia Univ., Athens. Bioluminescence Lab.
ROLE OF CALCIUM AND CALMODULIN IN PLANT CELL REGULATION
Milton J. Cormier *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 57-68 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The role of calcium and calmodulin in plant cell regulation is discussed. Experiments are done to discover the level of calcium in plants and animals. The effect of intracellular calcium on photosynthesis is discussed. B.W.

N84-11726*# Connecticut Univ., Farmington. Dept. of Physiology.
LOCAL CALCIUM ENTRY AND THE GUIDANCE OF GROWTH
Kenneth R. Robinson *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 69-82 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The role of calcium in developing cells is illustrated. The Fucus egg, a brown algae is used to describe this phenomenom. Results of local calcium entry and forced calcium entry into the eggs are given. B.W.

N84-11727*# State Univ. of New York, Stony Brook. Dept. of Cellular and Comparative Biology.
DEVELOPING HIGHER PLANT SYSTEMS IN SPACE
Abraham D. Krikorian *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 83-96 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The effects of hypogravity and microgravity environments on plant cells are discussed. Experiments on embryos of carrots are discussed. Simulation and spacecraft environments were used in experiments. R.J.F.

N84-11728*# Michigan Univ., Ann Arbor. Biological Sciences Div.
GRAVITROPIC RESPONSES IN THE GRASS PULVINUS: MODEL SYSTEM FOR ASYMMETRIC GROWTH
Peter B. Kaufman *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 97-110 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Gravitropic responses in the grass pulvinus consituting a model system for asymmetric growth are discussed. The geotropic responses of the grass under various hormonal conditions are discussed. R.J.F.

N84-11729*# National Aeronautics and Space Administration, Washington, D. C.
BONE AND CALCIUM ALTERATIONS DURING SPACEFLIGHT
Emily M. Holton *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 111-126 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Bone demineralization caused by weightlessness during space flight is discussed. Bones of rats were examined and the results are given. R.J.F.

N84-11730*# California Univ., Davis. Dept. of Physiology.
GRAVITATIONAL STUDY OF THE CENTRAL NERVOUS SYSTEM
John M. Horowitz *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 127-132 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

A series of experiments conducted at 1G are discussed with reference to the role of calcium ions in information processing by the central nervous system. A technique is described which allows thin sections of a mammalian hippocampus to be isolated while maintaining neural activity. Two experiments carried out in hypergravic fields are also addressed; one investigating altered stimulation in the auditory system, the other determining temperature regulation responses in hypergravic fields. M.G.

N84-11731*# Indiana Univ., Bloomington. Dept. of Biology.
POLARITY OF THE AMPHIBIAN EGG
George M. Malacinski *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 133-141 ref (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Amphibian egg polarity and the mechanism which generates the polarity is addressed. Of particular concern is the question of whether the activation rotation which responds to gravity is a prerequisite for normal development. M.G.

N84-11732*# National Aeronautics and Space Administration, Washington, D. C.
PROGRAMMATIC COMMENTS

Gerry Soffen, Bill Bishop, and Richard Young *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 142-146 (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The life science programs of NASA are informally discussed. Research areas can be generally categorized as space biology, aerospace medicine, origins of life, biomedical research, and life support systems. The role of the life sciences in the development of the space station and the experimental opportunities afforded by such a facility are addressed. M.G.

N84-11733*# Michigan Univ., Ann Arbor. Dept. of Anatomy.
CALCIUM IONS, STORES, AND MODULATORS: WHAT IS THE GRAVITY RECEPTOR CONNECTION?
Muriel D. Ross *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 147-164 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The effect of weightlessness on gravireceptors is considered in an effort to shed light on the etiology of space motion sickness. The structures of the gravireceptors (crystals and neuroepithelium) are examined to determine the role piezoelectricity plays. B.G.

N84-11734*# Yale Univ., New Haven, Conn. Dept. of Cell Biology.
THE PLASMA MEMBRANE CALCIUM PUMP
Howard Rasmussen *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 165-179 (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Three aspect of cellular calcium metabolism in animal cells was discussed including the importance of the plasma membrane in calcium homeostasis, experiments dealing with the actual mechanism of the calcium pump, and the function of the pump in relationship to the mitochondria and to the function of calmodulin in the intact cell. B.G.

N84-11735*# Vanderbilt Univ., Nashville, Tenn. Dept. of Pharmacology.
CARBOXYLIC ACID IONOPHORES AS PROBES OF THE ROLE OF CALCIUM IN BIOLOGICAL SYSTEMS
Peter W. Reed *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 180-199 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The biological effects of calcium ionophores are described, focusing on arachidonic acid oxygenation, and the formation of a number of oxygenated metabolites of arachidonic acid. These metabolites are involved in a number of bodily functions, and their production may be regulated by calcium. B.G.

N84-11736*# California Univ., Berkeley.
MEASUREMENT AND CONTROL OF FREE CALCIUM INSIDE SMALL INTACT CELLS
Roger Y. Tsien *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 200-217 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The use of dye to measure intracellular free calcium concentration was discussed. Difficulty in measuring the calcium is caused by two problems: the small amount of calcium available for testing, and the selectivity to bind calcium at 100 nanomolar excludes substances from entering the cell. B.G.

N84-11737*# Baylor Coll. of Medicine, Houston, Tex. Dept. of Cell Biology.
ROLE OF CALMODULIN IN CELL PROLIFERATION
James Chafouleas *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 218-232 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Calmodulin levels were found to increase as cells enter plateau. The data suggest that the cells are exiting the cell cycle late in the G sub 1 phase, or that the calmodulin levels in plateau cells are uncoupled to progression into S phase in plateau cells. Upon release, calmodulin levels rapidly decrease. Following this decrease, there is a increase prior to S phase. N.W.

N84-11738*# Albert Einstein Coll. of Medicine, New York. Cellular Neurobiology Div.
CONTROLS OF INTRACELLULAR COMMUNICATION MEDIATED BY GAP JUNCTIONS
Michael V. L. Bennett *In* Texas Univ. The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 233-244 refs (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

Experiments were done using aequorin and no increase in aequorin luminescence during acidification adequate to uncouple cells was seen. The pH sensitivity of the conductance of the perfused membrane was essentially the same as that observed with intracellular pH microelectrodes. Author

N84-11739*# Texas Univ., Austin.
SUMMARY OF STUDY GROUP SESSION DISCUSSIONS
In its The Regulatory Functions of Calcium and the Potential Role of Calcium in Mediating Gravitational Responses in Cells and Tissues Nov. 1983 p 245-288 (For primary document see N84-11720 02-51)
Avail: NTIS HC A13/MF A01 CSCL 06B

The relationship between gravitational physiology and calcium metabolism is examined. The role of gravity on the problems of bone response, low gravity environments, calcium in plants, and the potential in animal systems for alterations in nerve and muscle function as variations in extracellular calcium levels occurred are discussed. Innovative materials for experiments on interactions between calcium and gravity, experiments that could utilize ionospheres or calcium-measuring dyes, and specific gravity calcium experiments are also addressed. N.W.

N84-11740# Illinois Univ., Urbana. Dept. of Physiology and Biophysics.
PHOTOSYNTHESIS IN INTACT PLANTS
Anthony R. Crofts 1983 10 p refs
(Contract DE-AC02-80ER-10701)
(DE83-016045; DOE/ER-10701/T1) Avail: NTIS HC A02/MF A01

A four-stage approach to the study of photosynthesis at the molecular level in intact plants is described. The approaches are: (1) development and construction of laboratory apparatus for the study of photosynthesis in suspensions and in detached leaves in a laboratory environment; (2) laboratory experiments to evaluate the apparatus; (3) development and construction of apparatus for use in the field; and (4) experiments in the field to study the effect of environmental factors on photosynthesis in situ. DOE

N84-11741# Oak Ridge National Lab., Tenn. Engineering Physics Div.
CALCULATIONS OF RADIATION FIELDS AND MONKEY MID-HEAD AND MID-THORAX RESPONSES IN AFRRI-TRIGA REACTOR FACILITY EXPERIMENTS
J. O. Johnson (Tennessee Univ.), M. B. Emmett, and J. V. Pace, III Jul. 1983 114 p refs
(Contract W-7405-eng-26)
(DE83-015483; ORNL/TM-8807) Avail: NTIS HC A06/MF A01

A computational study was performed to characterize the radiation exposure fields and the mid-head and mid-thorax response functions for monkeys irradiated. Discrete ordinates radiation transport calculations were performed in one dimensional herical

geometry to obtain the energy spectra of the neutrons and gamma rays entering the room through various spectrum modifiers and reaching the irradiation position. Adjoint calculations performed in two dimensional cylindrical geometry yielded the mid-head and mid-thorax response functions, which were then folded with flux spectra to obtain the monkey mid-head and mid-thorax doses (kerma rates) received at the irradiation position. The results are presented both as graphs and as tables. The resulting spectral shapes compared favorably with previous works; however, the magnitudes of the fluxes did not. The differences in the magnitudes may be due to the normalization factor used. DOE

N84-11742# Hohenheim Univ., Stuttgart (West Germany). Inst. fuer Tiermedizin und Tierhygiene.
HYGIENIC MICROBIOLOGICAL/VIROLOGICAL EXAMINATION OF AN AIRWASHER CONCERNING THE EMISSION OF AIRBORNE MICROORGANISMS Final Report, Jul. 1982
Dieter Strauch and Joachim Wekerle Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 147 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-130; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31

A biological air washer with activated sludge as absorbent is examined. The emission of virus aerosols and out-wash efficiency with airborne viruses were tested. The washer reduces airborne viruses in waste air by up to 69.5%, when activated sludge is used for absorbent and washer parameters are regulated optimally. However, this is accompanied by an emission of airborne virus with the purified air. In the absorbent of the washer, an accumulation of test agents used during separation was ascertained. Virus accumulation in the absorbent depends upon the test agents, the absorbent turnover and the air throughput. Separated virus was emitted out of the absorbent as a function of virus concentration in the absorbent, air throughput and absorbent turnover.
Author (ESA)

N84-11743# Health Effects Research Lab., Research Triangle Park, N. C.
INFLUENCE OF NITROGEN DIOXIDE ON XENOBIOTIC METABOLISM IN ANIMALS
J. A. Graham, J. W. Illing, F. J. Miller, and D. E. Gardner Jul. 1983 12 p refs
(PB83-239723; EP1-600/D-83-062) Avail: NTIS HC A02/MF A01 CSCL 06T

Potential extrapulmonary effects of nitrogen dioxide (NO2) on hepatic xenobiotic metabolism were examined. Initial studies were conducted using pentobarbital (PEN) induced sleeping time (S.T.) in mice as an indicator of integrated mechanisms of xenobiotic clearance. A 3 hr. exposure to concentrations as low as 0.47 mg NO2/cu. m. (0.25 ppm) caused a significant increase in PEN-induced S.T. in female mice. When exposures were repeated for several days, the magnitude of the effect diminished. Investigation of sex sensitivity indicated that female mice were affected by acute exposure (3 hr./day, 1 or 2 days), but males were not. It was also observed that a 4 day (3 hr./day) exposure to 1.88 mg NO2/cu. m. (1.0 ppm) induced tolerance to the effects of 9.4 mg NO2/cu. m. (5.0 ppm). Author (GRA)

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N84-11744* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROSTHETIC OCCLUSIVE DEVICE FOR AN INTERNAL PASSAGEWAY Patent
John B. Tenney, Jr., inventor (to NASA) (Rochester General Hospital) Issued 11 Oct. 1983 6 p Filed 23 Apr. 1982 Supersedes N82-26962 (20 - 17, p 2451) Sponsored by NASA
(NASA-Case-MFS-25740-1; US-Patent-4,408,597; US-Patent-Appl-SN-371352; US-Patent-Class-128-1R; US-Patent-Class-128-346; US-Patent-Class-128-DIG.25) Avail: US Patent and Trademark Office CSCL 06E

An occlusive device is disclosed for surgical implant to occlude the lumen of an internal organ. The device includes a cuff having a backing collar and two isolated cuff chambers. The fluid pressure of one chamber is regulated by a pump/valve reservoir unit. The other chamber is unregulated in pressure but its fluid volume is adjusted by removing or adding fluid to a septum/reservoir by means of a hypodermic needle. Pressure changes are transmitted between the two cuff chambers via faying surfaces which are sufficiently large in contact area and thin as to transmit pressure generally without attenuation. By adjusting the fluid volume of the septum, the operating pressure of the device may be adjusted to accommodate tubular organs of different diameter sizes as well as to compensate for changes in the organ following implant without reoperation.
Official Gazette of the U.S. Patent and Trademark Office

N84-11745# Naval Medical Research Inst., Bethesda, Md.
EFFICIENCY OF HIGH-FREQUENCY VENTILATION AS DETERMINED BY NITROGEN WASHOUTS: A MODEL STUDY Final Progress Report
J. R. Clarke, L. D. Romer, and E. T. Flynn Apr. 1983 26 p refs (MR0000101)
(AD-A131331; NMRI-83-09) Avail: NTIS HC A03/MF A01 CSCL 06/19

We examined the frequency dependency of high-frequency ventilation (HFV) by using a two-compartment mechanical model. A loudspeaker was used as an oscillator to assist mixing between the two compartments. One compartment (C1) contained either O2 or SF6 prior to mixing, while the other (C2) contained air. The rate of change of nitrogen concentration in the latter compartment was used as an index of mixing efficiency. The speaker was driven with either a sinusoidal or random signal, and the spectral characteristics and acoustic power of the pressures generated in each compartment were determined by a Fast Fourier Transform Analyzer and PDP 11/34 and /70 computers. Transport coefficients describing mixing increased approximately linearly with power. For a given power in C1, the mixing rates were highly frequency-dependent. The frequencies for resonance and optimal mixing were essentially identical, and decreased as gas density increased. When powers were matched in C2, however, mixing was much less dependent on frequency. Random noise proved as effective in augmenting mixing as sinusoidal excitation. It can do so while decreasing the magnitude of pressure changes in the system and while reducing the influence of changing resonant frequencies.
Author (GRA)

N84-11746# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
COMPUTATIONAL STUDIES IN THE INTERPRETATION OF STRUCTURE AND MOTION: SUMMARY AND EXTENSION
Shimon Ullman Mar. 1983 28 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A131598; AI-M-706) Avail: NTIS HC A03/MF A01 CSCL 06/16

Computational studies of the interpretation of structure from notion examine the conditions under which three dimensional structure can be recovered from motion in the image. The first part of this paper summarizes the main results obtained to date in these studies. The second part examines two issues: the robustness of the 3-D interpretation of perspective velocity fields, and the 3-D information contained in orthographic velocity fields. The two are related because, under local analysis, limitations on the interpretation of orthographic velocity fields also apply to perspective projection. The following results are established: When the interpretation is applied locally, the 3-D interpretation of the perspective velocity field is unstable; The orthographic velocity field determines the structure of the inducing object exactly up to a depth-scaling; For planar objects, the orthographic velocity field

always admits two distinct solutions up to depth-scaling; and The 3-D structure is determined uniquely by a view and a half of the orthographic velocity field. Author (GRA)

N84-11747# Utah Univ., Salt Lake City. Dept. of Mathematics.
ULTRASOUND TOMOGRAPHY BY GALERKIN OR MOMENT METHODS
Steven A. Johnson and Frank Stenger 5 May 1983 30 p refs
(Contract DAAG29-83-K-0012; Grants PDP-110B; R01-CA1-29728)
(AD-A131408; ARO-19297.2-MA) Avail: NTIS HC A03/MF A01 CSCL 06/5

Ultrasound B-scan imaging is now a well established and valuable clinical tool. Improvements in transducer arrays and microprocessor controls have lead to the development of real time linear and sector scanners which produce images of remarkable clarity and resolution compared with B-scanners of only a few years ago. Further improvements in B-scan images are predicted to occur as larger transducer apertures and improved dynamic focusing methods are employed. The use of Doppler ultrasound alone or in combination with real time B-scan imaging is expected to increase in importance as the clinical significance of high resolution Doppler images is appreciated. During the past decade X-ray C.T. (computed tomography) and recently NMR imaging have made remarkable contributions to the field of diagnostic imaging. X-ray (C.T.) and NMR images not only provide resolution of about 1 mm but also can be calibrated by absolute reference standards. The resulting quantitative images have proven to be valuable because of the greater ability thus provided to distinguish healthly and diseased tissue by their image values. GRA

N84-11748# Pacific Northwest Lab., Richland, Wash.
CONCEPTS OF DOSE TO SOFT TISSUE AT THE CELLULAR LEVEL
D. R. Fisher May 1983 24 p refs Presented at the Health Phys. Soc. Summer School, Baltimore, 13-17 Jun. 1983
(Contract DE-AC06-76RL-01830)
(DE83-013830; PNL-SA-11419; CONF-830665-3) Avail: NTIS HC A02/MF A01

Radiation effects begin at the cellular level of biological organization. Radiation dosimetry at the cellular level is particularly important for internally deposited alpha and beta particle emitters. Microdosimetry is a mechanism for studying the dose imparted to microscopic sites, for determining hit probabilities, and for determining the probability that sites are missed. Internal microdosimetry calculations are complex, but can be easily executed using computer programs. The target and its size must be specified, the radionuclide activity per unit mass for each region in which targets are located determined, the activity per radioactive particulate described, the geometrical relationship between the activity and the targets understood, and the biological retention of the activity in the region as a function of time accounted for. Internal microdosimetry has many potential applications in radiological protection. Microdosimetry is a special research area designed to provide a better understanding of the importance of microscopic patterns of radiation interactionn with cells within the broader framework of biochemistry and radiation biology. DOE

N84-11749# Pacific Northwest Lab., Richland, Wash.
EVALUATION OF A DRAFT STANDARD ON PERFORMANCE SPECIFICATIONS FOR HEALTH PHYSICS INSTRUMENTATION
J. L. Kenoyer, K. L. Swinth, R. L. Kathren, and J. M. Selby Jun. 1983 22 p ref Presented at the 28th Health Phys. Soc. Ann. Meeting, Baltimore, 19-23 Jun. 1983 Sponsored in part by Nuclear Regulatory Commission
(Contract DE-AC06-76RL-01830)
(DE83-016169; PNL-SA-11055; CONF-830695-3) Avail: NTIS HC A02/MF A01

The draft ANSI standard N42.17 on performance specifications for health physics instrumentation was written in 1981; the second draft of this standard is currently being evaluated by Pacific Northwest Laboratory. Objectives of this project include the evaluation of the applicability and practicality of the proposed standard and the determination of the degree of conformance of a cross section of currently available commercial instruments to the proposed standard. This standard is being tested against such instruments as ionization chambers, G.M. detectors, alpha survey meters, and neutron dose equivalent survey meters. Results on the use of the first two categories will be presented in this paper. Procurement of instruments for testing was accomplished by direct purchase ofoff-the-shelf units and by loan from instrument manufacturers and others including DOE laboratories. The testing procedures were developed with emphasis on the requirements found in ANSI N42.17 with additional criteria from other draft and current ANSI and IEC standards. Details of procedures on effects of temperature, humidity, and ambient pressure, will be presented in this paper. DOE

N84-11750# Pacific Northwest Lab., Richland, Wash.
EVALUATION OF A DRAFT STANDARD ON PERFORMANCE SPECIFICATIONS FOR HEALTH PHYSICS INSTRUMENTATION
Kenneth L. Swinth, Judson L. Kenoyer, Andrew P. Mileham, Ronald L. Kathren, and Jack M. Selby Jun. 1983 20 p Presented at the Health Phys. Soc. Ann. Meeting, Baltimore, 19-23 Jun. 1983 Sponsored in part by the Nuclear Regulatory Commission
(Contract DE-AC06-76RL-01830)
(DE83-016186; PNL-SA-11058; CONF-830695-4) Avail: NTIS HC A02/MF A01

The draft ANSI standard N42.17D2 on performance specifications for health physics instrumentation is currently being evaluated by the Pacific Northwest Laboratory. The primary objective of the project is the evaluation of the applicability and practicality of the proposed standard through testing of a cross-section of currently available commercial instruments to determine how well they conform to the standard. The standard is being tested against instruments such as ionization chambers, G.M. detectors, alpha survey meters, and neutron dose equivalent survey meters. This paper presents results of the preliminary radiological performance tests on ionization chambers and G.M. detectors. This includes both the data generated during the tests and a discussion of procedures developed to perform the testing. Results are reported for response time, accuracy, precision, radiation overloads, and angular dependence. In addition, results are reported for parameters that affect instrument performance including battery lifetime, geotropism and stability. DOE

N84-11751# Oak Ridge National Lab., Tenn. Health and Safety Research Div.
ACCURACY OF EXTERNAL PERSONNEL DOSIMETRY SYSTEMS IN MIXED NEUTRON AND GAMMA RADIATION FIELDS
R. E. Swaja 1983 3 p refs Presented at the 7th Intern. Conf. on Radiation Res., Amsterdam, 3-8 Jul. 1983
(Contract W-7405-eng-26)
(DE83-015712; CONF-830710-6) Avail: NTIS HC A02/MF A01

Estimates of biological effects associated with exposure to external radiation fields are generally based on the measured response of passive personnel dosimetry systems to the incident radiation. The increasing number of persons occupationally exposed to mixed neutron and gamma fields and recent questions concerning the relative biological hazards of different types of radiation have emphasized the need for accurate personnel radiation dose measurements. The performance characteristics of various neutron and gamma personnel dosimetry systems under actual mixed-field conditions have been determined. Analysis of the results indicates that significant inaccuracies can occur in neutron and gamma dose measurements in mixed radiation fields unless dosimeter performance and characteristics of the monitoring environment are considered in dosimeter evaluation. DOE

N84-11752# Bruker Analytische Messtechnik G.m.b.H., Rheinstetten (West Germany).
DEVELOPMENT AND CONSTRUCTION OF AN APPARATUS BASED ON THE PRINCIPLE OF MULTIDIMENSIONAL NUCLEAR MAGNETIC RESONANCE FOR THE FORMATION OF IMAGES OF ORGANS AND PARTS OF THE BODY Final Report, May 1981

Bertold Knuettel Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 37 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-102; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8

An NMR tomograph which uses an iron magnet and is designed for imaging objects up to 7.5 cm diameter at a frequency of 30 MHz, and an NMR tomograph for application to large objects (head and whole body scanning) with a large air-core magnet at 1.5 kG (6 MHz) were built. The iron magnet system has good resolution but long measuring times for two dimensional imaging, while worse resolution and rather shorter time for three dimensional imaging. Two dimensional images obtained by the air core magnet provide good resolution even for details like skull bones with scalp. Author (ESA) 1

N84-11753# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Elektronische Bauelemente.
CIVIL APPLICATIONS OF INFRARED TECHNIQUES Final Report, Mar. 1982
Horst Maier and Konrad Abel (Eltro GmbH) Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 314 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-132; ISSN-0340-7608) Avail: NTIS HC A14/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 48

Infrared detectors, pyrometers and thermographic cameras were analyzed with respect to applications in medicine, energy conservation, industrial equipment and production control. Results show that modern technologies and product programs largely fulfil civil requirements. However, adaption to specific problems is often necessary. Modifications and additional equipment are suggested where desirable. Author (ESA)

N84-11754# Health Effects Research Lab., Research Triangle Park, N. C.
BIOASSAY OF PARTICULATE ORGANIC MATTER FROM AMBIENT AIR
Joellen Lewtas Huisingh, Michael Waters, Larry Claxton, Alan Kolber (Research Triangle Inst.), Thomas Wolff (Research Triangle Inst.), Thomas Hughes (Research Triangle Inst.), and Edo D. Pellizzari (Research Triangle Inst.) Jul. 1983 28 p refs
(PB83-239731; EPA-600/D-81-266) Avail: NTIS HC A03/MF A01 CSCL 06T

The influence of industrialization and consequent increased concentration of urban particulate matter on the incidence of cancer has long been a concern. The first bioassys used to evaluate complex ambient air samples were whole-animal carcinogenesis bioassays. In these studies, organic extracts of urban particulate matter were found to be carcinogenic in rodents. Carcinogenic polycyclic aromatic hydrocarbons (PAH), such as benzo(a)pyrene, were defected in these extracts; however, these compounds did not account for all of the carcinogenic activity reported. GRA

N84-11755# California Univ., Davis. Human Performance Lab.
OZONE TOXICITY EFFECTS CONSEQUENT TO PROLONGED, HIGH INTENSITY EXERCISE Final Report, Dec. 1980 - Aug. 1982
W. C. Adams and E. S. Schelegle Aug. 1982 61 p refs
(PB83-237388; ARB-R-83-191) Avail: NTIS HC A04/MF A01 CSCL 06T

The purpose of the study was: (1) to investigate the effects of ozone exposure combined with very high ventilation volumes during exercise and (2) to study selected ventilatory and respiratory metabolism parameters and subjective symptomatology which suggests mechanisms for loss of maximal aerobic performance following ozone exposure. Author (GRA)

N84-11694# Joint Publications Research Service, Arlington, Va.
STUDY OF CARDIOVASCULAR SYSTEM DURING LONG-TERM SPACEFLIGHTS
A. D. Yegorov and O. G. Itsekhovskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 1-5 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 4-6 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11695# Joint Publications Research Service, Arlington, Va.
SIMULATION OF CEREBROCRANIAL TRAUMA FOR EVALUATION AND DEVELOPMENT OF GEAR TO PROTECT PILOTS AGAINST IMPACTS
A. S. Barer, V. I. Kharchenko, Yu. G. Konakhevich, L. N. Sholpo, G. N. Dubalskiy, V. Kh. Petlyuk, and N. A. Uglanova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 6-15 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 7-12 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11697# Joint Publications Research Service, Arlington, Va.
CHANGES IN CARDIAC OUTPUT AND ORTHOSTATIC STABILITY OF COSMONAUTS
P. V. Vasilyev, A. D. Voskresenkiy, V. G. Doroshev, V. V. Kalinichenko, N. A. Lapshina, and V. V. Shchigolev *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 32-35 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 25-27 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11698# Joint Publications Research Service, Arlington, Va.
HEMODYNAMIC REACTIONS TO POSITIVE INTRATHORACIC PRESSURE AT +G SUB Z ACCELERATIONS
M. A. Tikhonov, D. Yu. Arkhangelskiy, A. V. Kondakov, and V. V. Litovchenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 36-40 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 27-30 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11699# Joint Publications Research Service, Arlington, Va.
NORMAL HUMAN CORONARY CIRCULATION DURING POSTURAL TESTS AND DECOMPRESSION OF LOWER HALF OF BODY
V. Ye. Katkov, V. V. Chestukhin, V. V. Rumyantsev, Ye. V. Kolpakov, N. V. Pravetskiy, and S. V. Agafonov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 41-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 30-36 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11700# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF RHEOGRAPHIC PARAMETERS OF CEREBRAL CIRCULATION AND CIRCULATION IN THE EXTREMITIES DURING ACTIVE ORTHOSTATIC TEST
N. I. Sapova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 36-39 No. 5, Sep.-Oct. 1983 p 50-55 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11701# Joint Publications Research Service, Arlington, Va.
EFFECT OF REDISTRIBUTION OF BLOOD ON SEVERITY OF SPATIAL POSITION ILLUSIONS IN WEIGHTLESSNESS
F. A. Solodovnik, A. V. Chapayev, A. A. Prusskiy, and A. A. Simakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 56-60 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct.

1983 p 40-43 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11702# Joint Publications Research Service, Arlington, Va.
FREE AMINO ACIDS OF BLOOD BEFORE AND AFTER SHORT-TERM SPACEFLIGHTS
T. F. Vlasova, Ye. B. Miroshnikova, and A. S. Ushakov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 61-63 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 43-45 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11703# Joint Publications Research Service, Arlington, Va.
CHANGES IN BLOOD UREA CONTENT UNDER HYPOKINETIC CONDITIONS
I. S. Balakhovskiy and T. A. Orlova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 64-69 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 45-48 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11704# Joint Publications Research Service, Arlington, Va.
ENERGY METALBOLISM ENZYMES IN SIMULATION OF SOME SPACEFLIGHT FACTORS
S. Kalandarov, V. P. Bychkov, I. D. Frenkel, L. P. Volkova, and G. I. Proskurova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 70-73 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 49-51 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11712# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL PSYCHOLOGICAL METHODS USED IN EXPERT EVALUATION OF MENTAL WORK CAPACITY OF FLIGHT PERSONNEL IN THE PRESENCE OF FUNCTIONAL DISTURBANCES AND CENTRAL NERVOUS SYSTEM DISEASES
I. N. Lavrentyeva, V. I. Myasnikov, and V. F. Volokhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 111-116 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 76-80 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11714# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF A SUBJECTS CONDITION ACCORDING TO PITCH OF THE VOCAL VOWEL 'A'
G. I. Akinshchikova and O. D. Volchek *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 121-123 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 82-83 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11716# Joint Publications Research Service, Arlington, Va.
A METHOD OF ASSESSING CARDIAC FUNCTION WITH BICYCLE ERGOMETRY IN EXPERT MEDICAL CERTIFICATION OF PILOTS
E. G. Mukhamedov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 127-130 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 84-86 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11717# Joint Publications Research Service, Arlington, Va.
EVALUATION OF SKELETAL MUSCLE TONE BY RECORDING LATERAL RIGIDITY
G. I. Gevlich, L. S. Grigoryeva, M. I. Boyko, and I. B. Kozlovskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 131-137 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 86-89 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N84-11756# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
METAPHOR AND COMMON-SENSE REASONING Interim Report
Jaime G. Carbonell and Steven Minton 5 Mar. 1983 27 p refs (Contracts N00014-79-C-0661; N00014-82-C-5076)
(AD-A131423; CMU-CS-83-110) Avail: NTIS HC A03/MF A01 CSCL 05/10

Inferences based on metaphors appear to play a major role in human common sense reasoning. This paper identifies and analyzes general inference patterns based upon underlying metaphors, in particular the pervasive balance principle. Strategies for metaphor comprehension are explored, and analogical mapping structures are proposed as a means of representing metaphorical relationships between domains. In addition, a framework for a computational model embodying principles of metaphorical common sense reasoning is discussed. GRA

N84-11757# Air Force Human Resources Lab., Brooks AFB, Tex.
COMPANION TRAINER AIRCRAFT: CONCEPT TEST Final Report
Robert T. Nullmeyer, Thomas H. Killion, and Milton E. Wood Jun. 1983 53 p refs
(AF Proj. 1123)
(AD-A131378; AFHRL-TR-82-33) Avail: NTIS HC A04/MF A01 CSCL 05/9

Faced with increasing budget constraints and a need to conserve the B-52 weapon system, the Strategic Air Command (SAC) has pursued several avenues to make continuation training programs more efficient. Because actual flight training is considered to be critical, one proposed solution involved the use of a low cost business jet aircraft to supplement reduced B-52 flying schedules. This aircraft would be augmented to provide training for the radar navigator, navigator, and electronic warfare officer (EWO), in addition to the pilot and copilot. Some training missions would be flown in this Companion Trainer Aircraft (CTA) to reduce the need to fly the B-52. The training effectiveness of a CTA program depends on two main assumptions: first, appropriate behaviors trained in the CTA will transfer positively to the B-52, and second, inappropriate behaviors will not transfer. A theoretical approach based on transfer-of-learning considerations for a CTA revealed particular difficulties in specifying transfer expectations for pilots and copilots. Previous attempts to use a second aircraft as a surrogate trainer have met with mixed results. Both positive and negative effects on primary aircraft performance were observed. In response to a congressional request for proof of the concept that a CTA could provide effective training, a study was designed involving operational SAC crews. This study employed a modified T-39B aircraft to supplement B-52 training for eight aircrews. The purpose of the study was to answer two major questions. First, what effect does flying the secondary aircraft have on primary aircraft performance? GRA

N84-11715# Joint Publications Research Service, Arlington, Va.
METHOD FOR ASSESSING MENTAL STRESS IN OPERATORS
B. N. Ryzhov and V. P. Salnitskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 124-126 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 83-84 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N84-11758* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ABSORBENT PRODUCT AND ARTICLES MADE THEREFROM Patent
Frederic S. Dawn and James V. Correale, inventors (to NASA) Issued 25 Oct. 1983 5 p Filed 14 Apr. 1982 Supersedes N82-26960 (20 - 17, p 2450) Division of US Patent-4,338,371, Patent Appl-SN-219681, filed 24 Dec. 1981 Sponsored by NASA (NASA-Case-MSC-18223-2; US-Patent-4,411,660; US-Patent-4,338,371; US-Patent-Appl-SN-368187; US-Patent-Appl-SN-219681; US-Patent-Class-604-396; US-Patent-Class-604-378; US-Patent-Class-604-368) Avail: US Patent and Trademark Office CSCL 06K

A multilayer absorbent product for use in contact with the skin to absorb fluids is described. The product has a water pervious facing layer for contacting the skin, and a first fibrous wicking layer overlaying the water pervious layer. A first container section is defined by inner and outer layers of a water pervious wicking material in between a first absorbent mass and a second container section defined by inner and outer layers of a water pervious wicking material between what is disposed a second absorbent mass, and a liquid impermeable/gas permeable layer overlaying the second fibrous wicking layer.
Official Gazette of the U.S. Patent and Trademark Office

N84-11759 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
RESULTS AND INTERPRETATION OF LABOR-HYGIENIC STUDIES IN THE PAINTSHOP OF THE JET ENGINE DEPOT OF THE WOENSDRECHT AIRBASE [RESULTATEN EN INTERPRETATIVE VAN ARBEIDSHGIENISCH ONDERZOEK VERRICHT IN DE SCHILDERSWERKPLAATS VAN HET DEPOT STRAALMOTOREN TEVENS VLIEGBASIS WOENSDRECHT]
J. Kaaijk and F. Oeseburg Nov. 1982 19 p refs In DUTCH; ENGLISH summary
(Contract A78/KLu/065)
(PML-1982-54; TDCK-77638) Copyright. Avail: Issuing Activity

A paintshop atmosphere was analyzed for health hazardous organic gases and dust. The concentrations of the identified organic compounds are far below the Dutch Hygienic Standards (MAL-valves). The concentration of total dust is of the order of the MAL value. The protection given by the respirators used by the personnel during the work is found to be insufficient. Author (ESA)

N84-11760*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPOSITION AND ANALYSIS OF A MODEL WASTE FOR A CELSS (CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM)
T. Wydeven Sep. 1983 13 p refs
(NASA-TM-84368; A-9350; NAS 1.15:84368; CELSS-24) Avail: NTIS HC A02/MF A01 CSCL 06K

A model waste based on a modest vegetarian diet is given, including composition and elemental analysis. Its use is recommended for evaluation of candidate waste treatment processes for a Controlled Ecological Life Support System (CELSS). Author

N84-11761*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF-LOCKING TELESCOPING MANIPULATOR ARM Patent Application
Malcolm F. Nesmith, inventor (to NASA) Filed 30 Sep. 1983 14 p
(NASA-Case-MFS-25906-1; US-Patent-Appl-SN-537757) Avail: NTIS HC A02/MF A01 CSCL 05H

A telescoping manipulator arm and pivotable finger assembly are disclosed. The telescoping arm assembly includes a generally T-shaped arm having three outwardly extending fingers guided on the grooved roller guides to compensate for environmental variations. The pivotable finger assembly includes four pivoting fingers. Arcuate teeth are formed on the ends of the fingers. A rack having teeth on four sides meshes with each one of the fingers. One surface of the rack includes teeth along its entire surface which mesh with teeth of the finger. The teeth at the remote end of the rack engage teeth of a gear wheel. NASA

N84-11762# Naval Ship Research and Development Center, Bethesda, Md.
A SURVEY OF ROBOTIC TECHNOLOGY
Glen Castore Jul. 1983 79 p refs
(AD-A130999; DTNSRDC-83/053) Avail: NTIS HC A05/MF A01 CSCL 13/9

Robotic Technology is surveyed as a prelude to examination of its use in Naval Air Maintenance tasks. Topics include Robot Classification schemes, programming techniques, power systems, manipulators, control systems, sensors, and end effectors. In this survey, a robot is defined as a machine with three components: a multifunctional manipulator to move objects and tools; a controller to store data and direct the manipulator; a power system for the manipulator. GRA

N84-11763# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
METHOD FOR EVALUATING OPERATOR INPUTS TO DIGITAL CONTROLLERS
James R. Vehnuizen 1983 6 p refs Presented at the 29th Intern. Symp. of the Instrument Soc. of Am., Albuquerque, N. Mex., 2-6 May 1983
(Contract DE-AC07-76ID-01570)
(DE83-013521; EGG-M-17882; CONF-830518-5) Avail: NTIS HC A02/MF A01

Most industrial processes employ operator-interactive control systems. The performance of these control systems is influenced by the choice of control station (device through which operator enters control commands). While the importance of proper control station selection is widely accepted, standard and simple selection methods are not available for the control station using color graphics terminals. A facility for evaluating the effectiveness of various control stations is described. In the facility, a process is simulated on a hybrid computer, color graphics display terminals provide information to the operator, and different control stations accept input commands to control the simulation. Tests are being conducted to evaluate a keyboard, a graphics tablet, and a CRT touch pane for use as control stations on a nuclear power plant. Preliminary results indicate that the facility can be used to determine those situations where each type of station is advantageous. DOE

N84-11764# Sandia Labs., Albuquerque, N. Mex.
AN APPROACH TO MODELING OF HUMAN PERFORMANCE FOR PURPOSES OF PROBABILISTIC RISK ASSESSMENT
Alan D. Swain 1983 29 p refs Presented at the NATO Human Factors Meeting on the Theory and Nature of Human Error, Bellagio, Italy, 5-10 Sep. 1983
(Contract DE-AC04-76DP-00789)
(DE83-009292; SAND-83-0447C; CONF-830902-1) Avail: NTIS HC A03/MF A01

The general approach taken in NUREG/CR-1278 to model human performance in sufficient detail to permit probabilistic risk assessments of nuclear power plant operations is described. To show the basis for the more specific models in the above NUREG, a simplified model of the human component in man-machine systems is presented, the role of performance shaping factors is discussed, and special problems in modeling the cognitive aspect of behavior are described. DOE

N84-11765# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.
TECHNIQUE FOR MEASURING THE SOUND PRESSURE LEVELS UNDER FLYING HELMETS AND HEADSETS
A. M. Mimpen and G. F. Smoorenburg Dec. 1982 25 p ref In

DUTCH; ENGLISH summary
(Contract A80/K/112)
(IZF-1982-39; TDCK-77630) Avail: NTIS HC A02/MF A01

A measuring technique was developed to determine the equivalent sound pressure levels under flying helmets and headsets. Subjectively these sound levels are qualified as very high and potentially damaging for the ear. A miniature electret microphone placed near the entrance of the ear canal of subjects in the laboratory measured the frequency characteristic, corresponding to the chosen microphone position. It is shown that only the difference between the frequency characteristics of the electret microphone and the standard microphone of the noise dose meter is important. A frequency dependent correction for the position of the electret microphone near the ear canal is not required. However, this is true only if helmets or headsets are used. Additional corrections are required for the unprotected ear. A preliminary measurement in an Alouette 3 helicopter shows in the cockpit a level of 96 dB(A), an Leq = 85 dB(A) under the helmet without speech and an Leq of about 95 dB(A) with communication speech. Author (ESA)

N84-11339# Joint Publications Research Service, Arlington, Va.
REPORT ON DEVELOPMENT, INSTALLATION OF INDUSTRIAL ROBOTS
Klaus Krakat *In its* East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 9-24 refs Transl. into ENGLISH from FS Analysen (West Germany), no. 1, (For primary document see N84-11336 02-31)
Avail: NTIS HC A03 1981 p 1-23

N84-11696# Joint Publications Research Service, Arlington, Va.
AIRCRAFT CREW DIET IN EMERGENCY SITUATIONS
I. G. Popov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 16-31 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 12-24 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11709# Joint Publications Research Service, Arlington, Va.
PHYSIOLOGICAL AND ECOLOGICAL CHARACTERISTICS OF THE WATER FERN, AZOLLA PINNATA, AND PROSPECTS OF USING IT IN BIOLOGICAL LIFE-SUPPORT SYSTEM FOR MAN
Ye. Ya. Shepelev, Nguen Thyok, G. I. Meleshko, A. A. Antonyan, T. B. Galkina, and V. P. Naydina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 96-101 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 66-69 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

N84-11718# Joint Publications Research Service, Arlington, Va.
METHOD FOR IDENTIFYING TRACE CONTAMINANTS IN CHAMBER ATMOSPHERE AT HIGH PRESSURE
B. L. Avetisyants, O. A. Sukhorukov, O. N. Skalatskiy, and L. B. Zhukova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 17, No. 5, Sep.-Oct. 1983 p 138-141 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 5, Sep.-Oct. 1983 p 90-91 (For primary document see N84-11693 02-51)
Avail: NTIS HC A08

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N84-11766# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A DATA COMPRESSOR SYSTEM [UMSISTEMA DE COMPRESSAO DE DADOS]
Didier Jean Charpentier and Orion deOliveiraSilva Aug. 1983 15 p refs In PORTUGUESE; ENGLISH summary Presented at the 6th CNMAC, Sao Jose dos Campos, Brazil
(INPE-2847-PRE/389) Avail: NTIS HC A02/MF A01

With the spreading of computer technology, large programs, large blocks of text, digital satellite imagery and a wide variety of data bases were stored and retrieved by computers. While the storage cost is dropping continuously, the need for compression techniques for saving memory space (primary, secondary and terciary) still exists. Three decompressed texts are identical to the original ones. The algorithm is detailed. Implementations are given, as well as comparative results. Author

N84-11767*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HIGH-SPEED DIGITAL SIGNAL NORMALIZATION FOR FEATURE IDENTIFICATION
Jose A. Ortiz and Barry D. Meredith Nov. 1983 21 p refs
(NASA-TM-85719; NAS 1.15:85719) Avail: NTIS HC A02/MF A01 CSCL 09B

A design approach for high speed normalization of digital signals was developed. A reciprocal look up table technique is employed, where a digital value is mapped to its reciprocal via a high speed memory. This reciprocal is then multiplied with an input signal to obtain the normalized result. Normalization improves considerably the accuracy of certain feature identification algorithms. By using the concept of pipelining the multispectral sensor data processing rate is limited only by the speed of the multiplier. The breadboard system was found to operate at an execution rate of five million normalizations per second. This design features high precision, a reduced hardware complexity, high flexibility, and expandability which are very important considerations for spaceborne applications. It also accomplishes a high speed normalization rate essential for real time data processing. Author

N84-11768# Sandia Labs., Albuquerque, N. Mex.
USE OF DESKTOP COMPUTERS FOR DATA ACQUISITION
R. J. Flores 1983 6 p refs Presented at 7th Ann. Symp. of the Mexican Am. Engr. Soc., 3 May 1983
(Contract DE-AC04-76DP-00789)
(DE83-014277; SAND-83-1518C; CONF-830547-2) Avail: NTIS HC A02/MF A01

Data-acquisition system designers have a multitude of computers from which to choose. At Sandia Laboratories most systems are built using either mini or desk top computers. The capabilities of the current generation of Hewlett-Packard desk top computers are described and two applications at Sandia are presented. DOE

N84-11769# Oak Ridge National Lab., Tenn.
MICROPROCESSOR MULTI-TASK MONITOR

C. A. Ludemann 1983 6 p refs Real-Time Computer Appli. in Nucl. and Particle Phys. Conf., Berkeley, Calif., 16 May 1983
(Contract W-7405-eng-26)
(DE83-012590; CONF-830576-2) Avail: NTIS HC A02/MF A01

This paper describes a multi-task monitor program for microprocessors. Although written for the Intel 8085, it incorporates features that would be beneficial for implementation in other microprocessors used in controlling and monitoring experiments and accelerators. The monitor places permanent programs (tasks) arbitrarily located throughout ROM in a priority ordered queue. The programmer is provided with the flexibility to add new tasks or modified versions of existing tasks, without having to comply with previously defined task boundaries or having to reprogram all of ROM. Scheduling of tasks is triggered by timers, outside stimuli (interrupts), or inter-task communications. Context switching time is of the order of tenths of a millisecond. DOE

N84-11770# Oak Ridge National Lab., Tenn.
PARALLEL PROCESSOR FOR FAST EVENT ANALYSIS
D. C. Hensley 1983 5 p refs Presented at the 1983 Conf. on Real-Time Computer Appl. in Particle and Nucl. Phys., Berkeley, Calif. 16-19 May 1983
(Contract W-7405-eng-26)
(DE83-014050; CONF-830576-4) Avail: NTIS HC A02/MF A01

Current maximum data rates from the spin spectrometer of approx. 5000 events/s (up to 1.3 MBytes/s) and minimum analysis requiring at least 3000 operations/event require a CPU cycle time near 70 ns. In order to achieve an effective cycle time of 70 ns, a parallel processing device is proposed where up to four independent processors will be implemented in parallel. The individual processors are designed around the A2910 Microsequencer, the AM29116 micro-P, and the AM29517 Multiplier. Satellite histogramming in a mass memory system will be managed by a commerical 16-bit micro-P system. DOE

N84-11771# Sandia Labs., Albuquerque, N. Mex. Div. 2142.
RADIATION TESTING OF THE CMOS 8085 MICROPROCESSOR FAMILY
F. W. Sexton, R. E. Anderson, W. T. Corbett, A. E. Giddings, G. L. Hash, J. L. Jorgensen, W. S. Kim, T. M. Mnich, T. V. Nordstrom, A. Ochoa, Jr. et al 1983 20 p refs Presented at the 20th IEEE Ann. Conf. on Nucl. and Space Radiation Effects, Gatlinburg, Tenn., 18 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-014604; SAND-83-0615C; CONF-830714-13) Avail: NTIS HC A02/MF A01

Radiation testing of the SA3000 family, CMOS versions of the Intel 8085 microprocessor family, has demonstrated full functionality after 3 x 10 to the 6th power rad (Si) total dose. Static supply currents measured after reset increased from approximately 50 etaA to 500 (SIGMA) A at V/sub DD/ = 10V while maximum operating frequency decreased from greater than 10 MHz to 4 MHz at V/sub DD/ = 9V post 3 x 10 to the 6th power rad (Si). Output drive currents decreased 25% post 1 x 10 to the 6th power rad (Si) and 40% post 3 x 10 to the 6th power rad (Si). The nominal threshold voltage shift of discrete transistors measured under worst-case bias (n-channels, ON; p-channels, OFF) shifted -0.5 volts and -2.40 volts post 1 x 10 to the 6th power rad (Si) for n-channel and p-channel MOSFETs, respectively. Transient radiation upset levels of about 1 x rad (Si)/sec have been measured for parts from this family. Latch-up immunity has been demonstrated up to 1 x 10 to the 12th power rad (Si)/sec and electrical bench tests are discussed which prove this technology is immune to latch-up. The technology used for the SA3000 family is a 3(SIGMA)m silicon gate process fabricated in n and n+ epitaxial silicon. Functional test programs for each chip of the family are discussed. DOE

N84-11772# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
COMPUTER SCIENCE AND TECHNOLOGY: MICROCOMPUTER: A REVIEW OF FEDERAL AGENCY EXPERIENCES Final Report
Dennis Gilbert, Elizabeth Parker, and Lynne Rosenthal Jun. 1983 149 p refs
(PB83-238972; NBS-SP-500-102; LC-83-600545) Avail: NTIS HC A07/MF A01 CSCL 09B

The results of a recent study which reviewed Federal agency experience with microcomputers during the period of August 1982 to January 1983 are documented. Interviews conducted with the Federal agencies are presented in detail, summarized, and tabulated. Related management and technical issues are identified and discussed. GRA

N84-11337# Joint Publications Research Service, Arlington, Va.
PROGRAMMED M3T 300 TERMINALS DISCUSSED
In its East Europe Rept.: Sci. Affairs, no. 789 (JPRS-84426) 28 Sep. 1983 p 1-4 Transl. into ENGLISH from Vyber Informaci (Czechoslovakia), (For primary document see N84-11336 02-31) Avail: NTIS HC A03 no. 2, 1983 p 203-207

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N84-11773*# Remtech, Inc., Huntsville, Ala.
MINIVER UPGRADE FOR THE AVID SYSTEM. VOLUME 3: EXITS USER'S AND INPUT GUIDE Final Report
John E. Pond and Craig P. Schmitz Hampton, Va. NASA. Langley Research Center Aug. 1983 208 p refs 3 Vol.
(Contract NAS1-16983)
(NASA-CR-172214; NAS 1.26:172214) Avail: NTIS HC A10/MF A01 CSCL 12A

The successful design of thermal protection systems for vehicles operating in atmosphere and near-space environments requires accurate analyses of heating rate and temperature histories encountered along a trajectory. For preliminary design calculations, however, the requirement for accuracy must be tempered by the need for speed and versatility in computational tools used to determine thermal environments and structural thermal response. The MINIVER program was found to provide the proper balance between versatility, speed and accuracy for an aerothermal prediction tool. The advancement in computer aided design concepts at Langley Research Center (LaRC) in the past few years has made it desirable to incorporate the MINIVER program into the LaRC Advanced Vehicle Integrated Design, AVID, system. In order to effectively incorporate MINIVER into the AVID system, several changes to MINIVER were made. The thermal conduction options in MINIVER were removed and a new Explicit Interactive Thermal Structures (EXITS) code was developed. Many upgrades to the MINIVER code were made and a new Langley version of MINIVER called LANMIN was created. Author

N84-11774*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
USER'S GUIDE FOR A COMPUTER PROGRAM FOR CALCULATING THE ZERO-LIFT WAVE DRAG OF COMPLEX AIRCRAFT CONFIGURATIONS
Charlotte B. Craidon Nov. 1983 66 p refs
(NASA-TM-85670; L-15603; NAS 1.15:85670) Avail: NTIS HC A04/MF A01 CSCL 09B

A computer program was developed to extend the geometry input capabilities of previous versions of a supersonic zero lift wave drag computer program. The arbitrary geometry input description is flexible enough to describe almost any complex aircraft concept, so that highly accurate wave drag analysis can now be performed because complex geometries can be represented accurately and do not have to be modified to meet the requirements of a restricted input format. Author

N84-11775# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PORTABLE KERNEL FOR COMPUTERS [NUCLEO PORTATIL

PARA COMPUTADORES]
Carlos Sergio Castilho Pratti, Eliane Martins, and Maria de Fatima Mattiello Sep. 1983 13 p refs In PORTUGUESE; ENGLISH summary Presented at the 3rd Symp. on Basic Software Development for Microcomputers, Rio de Janeiro, 5-7 Dec. 1983
(INPE-2877-PRE/403) Avail: NTIS HC A02/MF A01

A portable executive, NOC, for different microcomputers, devoted to process control systems is presented. Each kernel is intended to support the specific execution of the application programs, which in their turn are considered as the only users of the systems. For this, NOC supports the processes concurrence, allowing the development of a real time multiprogramming environment. Author

N84-11776# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RECURSIVE ANALYSIS OF THE GEOMAGNETIC VECTOR FIELD [CALCULO RECURSIVO DO VETOR CAMPO GEOMAGNETICO]
Roberto Vieira da Fonseca Lopes, Valdemir Carrara, Helio Koiti Kuga, and Valder Matos deMedeiros Sep. 1983 40 p In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC, Belem, Para, Brazil, 6-13 Jul. 1983
(INPE-2865-PRE/400) Avail: NTIS HC A03/MF A01

A computer program to evaluate the geomagnetic field components in geographic reference systems by using the Gauss model of order and degree 10 and with the International Geomagnetic Reference Field Coefficients 1980 is presented. The algorithm is recursive and normalized formulas and constants are used for the sake of rapidity and precision. The geomagnetic field evaluation is useful in artificial satellites dynamics and in attitude sensor measurements simulation. Illustrative numerical results are presented. Author

N84-11777# Ohio State Univ., Columbus. Dept. of Computer and Information Science.
AN APPROACH TO EXPERT SYSTEMS FOR MECHANICAL DESIGN
David C. Brown (Worcester Polytechnic Inst., Mass.) and B. Chandrasekaran May 1983 21 p refs Presented at the IEEE Computer Soc., Trends and Appl. Conf., Gaithersburg, Md., May 1983
(Grant AF-AFOSR-0255-82; AF Proj. 2304)
(AD-A131340; AFOSR-83-0657TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

We present an approach to expert systems for mechanical design called Design Refinement, which addresses a subset of design activity by using a hierarchy of conceptual specialists that solve the design problem in a distributed manner, top-down, choosing from sets of design plans and refining the design at each level of the hierarchy. GRA

N84-11778# Rome Air Development Center, Griffiss AFB, N.Y.
THE EVOLUTION AND PRACTICAL APPLICATIONS OF FAILURE MODES AND EFFECTS ANALYSES
Heather B. Dussault Mar. 1983 114 p refs
(AF Proj. 2338)
(AD-A131358; RADC-TR-83-72) Avail: NTIS HC A06/MF A01 CSCL 09/2

Failure effects analysis allows a product to be studied early in its design and development stages where undesirable failure effects can be identified and readily corrected. This report is intended to give the reader a broad, general background in techniques available for failure effects analysis and their usefulness. Sixteen separate techniques, ranging from tabular failure modes and effects analysis and fault tree analysis to lesser known and more recently introduced techniques such as hardware/software interface analysis, are discussed. The current status and prospects for the future failure effects analysis are also discussed in the report. GRA

N84-11779# Rome Air Development Center, Griffiss AFB, N.Y.
THE USE OF A BEAM SPACE REPRESENTATION AND NONLINEAR PROGRAMMING IN PHASE-ONLY NULLING
Robert A. Shore May 1983 40 p refs
(AF Proj. 2305)
(AD-A131365; RADC-TR-83-124) Avail: NTIS HC A03/MF A01 CSCL 12/1

A new computational method is presented for calculating the phases required for minimized weight perturbation, phase-only null synthesis in linear array antenna patterns. The method uses nonlinear programming algorithms to determine the coefficients of a beam space representation of the optimal phase perturbations. The derivatives of the objective and null constraint functions with respect to the beam coefficients, required by the nonlinear programming algorithms, are calculated from analytic expressions. The beam space representation allows the number of unknowns to be reduced from half the number of array elements to the number of imposed null locations, and results in a significant reduction in computation time from that required to calculate the phase perturbations directly. GRA

N84-11780# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
AN EXTREMUM PRINCIPLE FOR SHAPE FROM CONTOUR
Michael Brady and Alan Yuille Jun. 1983 36 p refs
(Contracts N00014-80-C-0505; N00014-75-C-0643)
(AD-A131321; AI-M-711) Avail: NTIS HC A03/MF A01 CSCL 06/4

An extremum principle is developed that determines three-dimensional surface orientation from a two-dimensional contour. The principle maximizes the ratio of the area to the square of the perimeter, a measure of the compactness or symmetry of the three-dimensional surface. The principle interprets regular figures correctly and it interprets skew symmetries as oriented real symmetries. The maximum likelihood method approximates the principle on irregular figures, but we show that it consistently overestimates the slant of an ellipse. Author (GRA)

N84-11781# Naval Research Lab., Washington, D. C. Computer Science and Systems Branch.
A METHODOLOGY FOR COLLECTING VALID SOFTWARE ENGINEERING DATA Interim Report
Victor R. Basili and David M. Weiss 12 Jul. 1983 25 p refs
(RR140941)
(AD-A131332; NRL-8679) Avail: NTIS HC A02/MF A01 CSCL 05/1

An effective data collection method for evaluating software development methodologies and for studying the software development process is described. The method uses goal-directed data collection to evaluate methodologies with respect to the claims made for them. Such claims are used as a basis for defining the goals of the data collection, establishing a list of questions of interest to be answered by data analysis, defining a set of data categorization schemes, and designing a data collection form. Feasibility of the data collection methodology was demonstrated by applying it to five different projects in two different environments (other NRL Reports). The application showed that the methodology was both feasible and useful. GRA

N84-11782# Ohio State Univ., Columbus. Dept. of Computer and Information Science.
CSRL (CONCEPTUAL STRUCTURES REPRESENTATION LANGUAGE): A LANGUAGE FOR EXPERT SYSTEMS DIAGONSIS
Tom Bylander, Sanjay Mittal, and B. Chandrasekaran 1983 6 p refs
(Grant AF-AFOSR-0255-82; AF Proj. 2304)
(AD-A131403; AFOSR-83-0659TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

We present CSRL(Conceptual Structures Representation Language) as a language to facilitate the development of expert diagnosis systems based on a paradigm of cooperating diagnostic specialists. MDX, the medical diagnosis system that has been developed in our laboratory over the past few years is based on this paradigm. In our approach, diagnostic reasoning is one of several generic tasks, each of which calls for a particular

organizational and problem solving structure. A diagnostic structure is composed of a collection of specialists, each of which corresponds to a node or concept in a diagnostic hierarchy, e.g., a classification of diseases. A top-down strategy called establish-refine is used in which either a specialist establishes and then refines itself, or the specialist rejects itself, pruning the hierarchy that it heads. CSRL is a language for representing the concepts of a diagnostic hierarchy and for implementing the establish-refine process. The body of a concept specifies how it will respond to different messages from its super concept. The knowledge to establish or reject a concept is factored into knowledge groups, which corresponds to specific decisions in the diagnosis.

Author (GRA)

N84-11783# , General Electric Co., Arlington, Va. Data and Information Systems.

REPRESENTATION OF INFORMATION IN SOFTWARE DOCUMENTATION Final Report, 1 Aug. 1979 - 15 Jul. 1983

Deborah A. Boehm-Davis Jul. 1983 25 p refs

(Contract N00014-79-C-0595; RR0420901)

(AD-A131470; GEC/DIS/TR-83-388200-8) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report describes a series of six experiments designed to evaluate the performance of programmers using different forms of software documentation. The results from the first five experiments suggested that for sequential programs, succinct symbology leads to better performance than English prose, and a branching spatial arrangement provides the clearest display of control flow. The final experiment suggested that the most appropriate type of documentation for concurrent programs is different than the most appropriate type of documentation for strictly sequential programs. For simple programs and simple modifications, it was not crucial whether interprocess communications or control-flow information was highlighted in the documentation format. For more complex problems, it appeared that control-flow information was not necessary, and, in fact, may have interfered with performance. This report also describes the contents of the book: Human Factors in Computer Systems. This book is being published by Ablex Publishers and it contains several papers selected from the conference held in Gaithersburg, Maryland in March 1982.

Author (GRA)

N84-11784# General Electric Co., Arlington, Va. Data and Information Systems.

DOCUMENTATION OF CONCURRENT PROGRAMS

Deborah A. Boehm-Davis and Andrew M. Fregly Jul. 1983 65 p refs

(Contract N00014-79-C-0595; RR0420901)

(AD-A131476; GEC/DIS-TR-83-388200-7) Avail: NTIS HC A04/MF A01 CSCL 09/2

Research on documentation of sequential programs is extended into the domain of concurrent processing programs to examine whether the documentation for these programs requires additional information regarding interprocessor communication. Programmer performance was examined on a modification test, where modifications were made to either the data structure or control flow of the program. The data suggest that the most appropriate type of documentation for concurrent processing may be different than the most appropriate type of documentation for strictly sequential processing.

R.J.F.

N84-11785# Delaware Univ., Newark. Dept. of Computer and Information Sciences.

DESIGN OF A SYSTEM THAT UNDERSTANDS INFORMAL SPECIFICATIONS Interim Technical Report

Ralph M. Weischedel and Daniel L. Chester Apr. 1983 17 p refs

(Grant AF-AFOSR-0190-80; AF Proj. 2304)

(AD-A131479; AFOSR-83-0675TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper investigates an artificial intelligence to combining the advantages of both formal and natural languages. The long-term goal is a system which could take as input an English definition of a module, and generate an equivalent formal specification. In addition, the system should generate an English paraphrase of its understanding of the input, so that the user may easily check the system's understanding. The remainder of the paper describes the design decisions made in implementing a prototype to understand English texts defining data structures. Section 2 enumerates some of the reasons we feel are most important for using natural language. Section 3 defines the target specification language and the motivation in selecting it. Section 4 relates our experience in using a parser for texts defining data structures. Section 5 deals with semantic issues such as interpreting spatial metaphors and selecting precise translations of vague English terms. Related work and our conclusions are presented in sections 6 and 7.

GRA

N84-11786# Lincoln Lab., Mass. Inst. of Tech., Lexington.

AN ALGORITHM FOR MULTIPLE TARGET TRACKING AND DATA CORRELATION

Chaw-Bing Chang and Leonard C. Youens 13 Jun. 1983 58 p refs

(Contract F19628-80-C-0002)

(AD-A131313; ESD-TR-83-017; TR-643) Avail: NTIS HC A04/MF A01 CSCL 12/1

An algorithm for multiple target tracking and data correlation is described. A general description of the problem and solution is first given. More specific discussions on tracking with a passive infrared sensor then follow. An example is presented to illustrate the trade-off between algorithm complexity, performance, and processing requirements. Multiple target tracking is a classical problem with both civilian and military applications. Air traffic control is a notable civilian application area. Military applications range from air, ocean, and ground surveillance to missile defense. Due to a drastic increase in target density in recent years, this subject area has been a center of discussions in the open literatures and company reports.

GRA

N84-11787# Delaware Univ., Newark. Dept. of Computer and Information Sciences.

MAPPING BETWEEN SEMANTIC REPRESENTATIONS USING HORN CLAUSES

Ralph M. Weischedel Jun. 1983 10 p refs

(Grant AF-AFOSR-0190-80; AF Proj. 2304)

(AD-A131531; AFOSR-83-0686TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

Even after an unambiguous semantic interpretation has been computed for a sentence in context, there are at least three reasons that a system may map the semantic representation R into another from S: (1) The terms of R, while reflecting the user view, many require deeper understanding, e.g., may require a version S where metaphors have been analyzed; (2) Transformations of R may be more appropriate for the underlying application system, e.g., S may be a more nearly optimal form (these transformations may not be linguistically motivated); (3) Some transformations may depend on non-structural context. Design considerations may favor factoring the processing into two stages, for reasons of understandability or for easier transportability of the components. This paper describes the use of Horn clauses for the three classes of transformations listed above. The transformations are part of a system that converts the English description of a software module into a formal specification, i.e., an abstract data type.

GRA

N84-11788# General Accounting Office, Washington, D. C.

BIBLIOGRAPHY OF DOCUMENTS ISSUED BY THE GAO (GENERAL ACCOUNTING OFFICE) ON MATTERS RELATED TO ADP (AUTOMATIC DATA PROCESSING) JANUARY 1982 - DECEMBER 1982

May 1983 225 p

(PB83-238766) Avail: NTIS HC A10/MF A01 CSCL 09B

Over 300 citations and abstracts of ADP-related documentss released by the U.S. General Accounting Office (GAO) are presented. Included are references to audit reports, staff studies, speeches, testimonies, Comptroller General decisions, and other GAO documents. This bibliography can be used for a variety of

purposes, including in-depth research into a specific topic, searching for a particular document, maintaining current awareness, and general browsing. GRA

N84-11789# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
METHOD IN THE GENERATION OF A REAL-TIME INTERACTIVE DISPLAY
Danny G. Bannister 1983 3 p Presented at the 29th Intern. Symp. of the Instrument Soc. of Am., Albuquerque, N. Mex., 2-6 May 1983
(Contract DE-AC07-76ID-01570)
(DE83-013523; EGG-M-30282; CONF-830518-7) Avail: NTIS HC A02/MF A01

This paper describes a real-time/interactive display which parallels the dynamic alteration of variables found in an analog computer. The program consists of interactive/display routines and a preprocessor that links any number of variables, found in program common, with a standard video terminal. The simulation state is displayed in tabular formal and control commands are entered via the keyboard. The program represents a minimal computer burden and provides real-time data transfer. This new program provides a low-cost method for producing digital simulations which operate very similarly to real processes, and its ease in implementation makes it a useful part of any program. DOE

N84-11790# California Univ., Berkeley. Lawrence Berkeley Lab.
SPEC-DOC: A USER'S GUIDE TO SPECTROMETER SOFTWARE
S. Sinton, J. R. Garbow, J. D. Ackerman, G. Drobney, D. J. Ruben, and A. Pines May 1983 128 p
(Contract DE-AC03-76SF-00098)
(DE83-013295; LBL-PUB-3033) Avail: NTIS HC A07/MF A01

An operating system (SPEC) designed to control NMR spectrometers is described. It is actually one large program which handles many functions necessary to control each spectrometer. The general operation of SPEC is discussed, including how to get into the program and how to issue commands. The commands are discussed in detail, as well as the operation of the microprocessor based pulse programmer, spectrometer peripherals, supporting programs, and how to create and load a TEMP program. Appended are details on bootstrapping procedures, hardware specifics, a technical description of SPEC and how to change or recreate it, a description of microcode loading and the procedure for formatting floppies, disks, and recreating RDOS. DOE

N84-11791# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. Software Tools Sect.
CORE GRAPHICS USER'S MANUAL
R. Wayne Little 1 Apr. 1983 112 p refs
(Contract DE-AC07-76ID-01570)
(DE83-013206; EGG-IS-6281) Avail: NTIS HC A06/MF A01

Core Graphics is a general purpose, FORTRAN callable graphics and image display software system, implemented as a FORTRAN subroutine library. Its importance and usefulness arise from its device independence and its transportability, i.e., a program written using Core Graphics may be run on any of several different graphics devices and/or CPU's without modification. Core Graphics has been designed as a comprehensive integrated Image and Graphic System wherein the user can manipulate two distinct data types within the same coordinate reference frame. The Core Graphics user can handle both image and Graphic data in the real world sense and in a standard Cartesian coordinate system without concern for the pixel (picture element) placement or vector placement in screen coordinates. Furthermore, the features of Core Graphics free the user from concerns over data acquisition and display allowing him to concentrate on the Image or Graphics problem at hand. DOE

N84-11792# Stanford Univ., Calif. Systems Optimization Lab.
A NESTED-DECOMPOSITION APPROACH FOR SOLVING STAIRCASE LINEAR PROGRAMS
Philip C. Abrahamson Jun. 1983 93 p refs
(Contracts DE-AT03-76ER-72018; DE-AM03-76SF-00326; N00014-75-C-0267; Grants NSF MCS-81-19774; NSF MCS-79-26009; NSF ECS-80-12974)
(DE83-3013560; SOL-83-4) Avail: NTIS HC A05/MF A01

The Nested Decomposition Principle of Manne and Ho is applied to the dual of a T-period staircase linear program, generating a sequence of one-period problems. These problems are coordinated only through communication of price and activity information between adjacent periods; an optimal coordination is achieved after repeated solution of the individual problems. The duals of the one-period problems reflect more naturally the structure of the primal problem. In this setting, a modified algorithm is developed which accelerates convergence by parameterizing the information exchanged between periods. Typically, information is provided to period t from previous and subsequent periods in the form of surrogate columns and modified right-hand side, and surrogate rows and modified cost coefficients, respectively. This algorithm may be implemented either by using existing linear programming software to solve the one-period problems, or through the use of data structures specifically adapted to this approach. Update formulas for such data structures are given and computational strategies which further accelerate convergence are discussed. DOE

N84-11793# Science Applications, Inc., Palo Alto, Calif.
SOFTWARE DEVELOPMENT AND MAINTENANCE GUIDELINES, VOLUME 1
H. R. Downs May 1983 608 p refs Sponsored by Electric Power Research Inst.
(DE83-902192; EPRI-EL-3089-Vol-1) Avail: NTIS HC A01/MF A01

This report is a set of guidelines for the development and maintenance of software. The guidelines are intended for use by persons producing or managing the production of software for the Electric Power Industry. The guidelines will lead to better quality software, whose life cycle cost will be substantially less than software produced without such guidelines. It is recognized that the use of these guidlines may result in increased development cost; however, any such increases are offset by factors of two to ten in maintenace costs during the software life cycle. Although the guidelines do not require the use of any specific development methodology, they do specify that an organized, systematic methodology employing a phased approach shall be used. These guidelines provide overall procedural and documentation guidelines, as well as guidelines for each stage in the software life cycle process. This document is a first edition of what is envisioned to be a living and evolving set of guidelines. Substantial portions of these guidelines may be accomplished by the use of computerized tools and procedures. DOE

N84-11794# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. Software Tools Section.
APPLIB USER'S MANUAL
Doug Pace Jun. 1983 77 p
(Contract DE-AC07-76ID-01570)
(DE83-016238; EGG-IS-6319) Avail: NTIS HC A05/MF A01

APPLIB is a collection of routines and functions which extend the usability of FORTRAN. They provide a standard interface to many elementary functions and are for the use of the FORTRAN programmer wishing to write protable code. DOE

N84-11795# California Univ., Livermore. Lawrence Livermore Lab. Mechanical Engineering Dept.
MAZE: AN INPUT GENERATOR FOR DYNA2D AND NIKE2D
John O. Hallquist Jun. 1983 117 p refs
(Contract W-7405-eng-48)
(DE83-016415; UCID-19029-Rev-2) Avail: NTIS HC A06/MF A01

An interactive program (MAZE) that was developed as an input generator for DYNA2D, NIKE2D, and possibly other codes through the standard grid link file, SGLF is described. A user's manual is provided. DOE

N84-11796# Institute of Oceanographic Sciences, Taunton (England).
NONLINEAR FILTER SYSTEM FOR IMAGE PREPROCESSING Final Report, Dec. 1981
Hayo Giebel Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 46 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-83-001; ISSN-0170-9011) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,70

Applications of technical and industrial image processing that do not require recognition of complex shape are discussed. A digital preprocessing unit which recognizes textures or unforeseen noise events with high speed on gray scale images was elaborated. The unit consists of a two-dimensional filter with programmable nonlinear table lookup functions and an integration stage for distance measurements. A prototype was built on two boards and tested at video speed (5 MHz) with extensive data material. A series of problems submitted by the test programs were solved without exception. Author (ESA)

N84-11797 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
SYSTEM FOR COMPUTER GENERATED IMAGES AND DIGITAL RADAR LANDMASS SIMULATION SYSTEMS
Peter M. Gueldenpfennig, Manfred Haas, and Diether Elflein 1982 6 p Presented at ITEC Conf., Orlando, 1982
(MBB-UA-688-82-Oe) Copyright. Avail: Issuing Activity

A semiautomatic interactive system which generates data bases from digital landmass system (DLMS) data for computer generated/image visual systems (CGIVS) and for digital radar landmass simulation (DRLMS) systems is introduced. Terrain information and land use features can be obtained from DLMS data automatically for CGIVS and DLRMS data bases. Additional information is prepared interactively. Model libraries for CGI data bases developed by batch procedures are used. Data bases can also be developed solely by batch procedures. Author (ESA)

N84-11798# Istituto Nazionale di Fisica Nucleare, Frascati (Italy). Lab. Nazionale di Frascati.
MULTI-PARAMETRIC DATA ACQUISITION SYSTEM WITH DC11-C INTERFACE TOWARDS PDP 11/34
P. Tempesta and A. Valentini (Bari Univ.) 19 Apr. 1982 14 p
(DE82-906300; INFN/TC-82/5) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries CSCL 09B

This Validation Summary Report (VSR) for the Computer Sciences Corporation, CSTS BASIC Release BAS160 running under the CSTS II Release 2 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections shown all the discrepancies found - if any. These include an categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11799# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
DATA GENERAL CORPORATION ECLIPSE C/350, AOS AND AOS/VS HICOBOL REVISION 2.00 Validation Summary Report
19 Jan. 1983 68 p
(PB83-233486; OSD/FSTC-82/271) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Data General Corporation, AOS & AOS/VS HICOBOL, Revision 2.00 running under the AOS Revision 4.20 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11800# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
DATA GENERAL CORPORATION ECLIPSE MV/8000, AOS/VS FORTRAN 77 REVISION 2.11 Validation Summary Report
2 Feb. 1983 15 p
(PB83-233262; OSD/FSTC-82/272) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Data General Corporation, AOS/VS FORTRAN 77, Revision 2.11 running under the AOS/VS Revision 1.61 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11801# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
DIGITAL EQUIPMENT CORPORATION VAX-11/750, VAX-11 BASIC V2.0 Validation Summary Report
10 Feb. 1983 14 p
(PB83-233213; OSD/FSTC-82/306) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Digital Equipment Corporation, VAX-11 BASIC V2.0 running under the VAX/VMS Version 3.2 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11802# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
DIGITAL EQUIPMENT CORPORATION, PDP-11/24, PDP-11 BASIC-PLUS-2 Validation Summary Report
10 Feb. 1983 22 p
(PB83-233205; OD/FSTC-82/307) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Digital Equipment Corporation, PDP-11 BASIC-PLUS-2 running under the RSX-11M-PLUS V2.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11803# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
PERKIN-ELMER, PERKIN-ELMER 3240, FORTRAN 7 RELEASE RO5-01 Validation Summary Report
7 Jun. 1983 13 p
(PB83-233072; OSD/FSTC-83/206) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) fo the Perkin-Elmer, FORTRAN 7 Release RO5-01 running under the OS/32 Release RO6-02 provides a consolidated summary of the results obtained

from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11804# National Bureau of Standards, Washington, D.C.
FASTMENU: A SET OF FORTRAN PROGRAMS FOR ANALYZING SURFACE TEXTURE
Theodore V. Vorburger Jul. 1983 127 p refs
(PB83-240838; NBSIR-83-2703) Avail: NTIS HC A07/MF A01 CSCL 14B

A set of FORTRAN programs for surface texture analysis is described. These programs were developed for use with a minicomputer that is interfaced to stylus type instruments. The programs (1) perform data acquisition from the stylus instruments, (2) store the data on magnetic disk, and (3) perform statistical analyses for parameters such as the roughness average Ra, rms roughness Rq, and for the autocorrelation function and amplitude density function. GRA

N84-11805# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
NCR CORPORATION, NCR 19300, ITX COBOL, RELEASE 1.0 (COBOL TECHNICAL REPORT)
13 May 1983 14 p
(PB83-241943; OSD/FSTC-83/177) Avail: NTIS HC A02/MF A01 CSCL 09B

This FSTC Technical Report for the NCR Corporation, NCR ITX COBOL Release 1.0 running under the NCR ITX Release 1.0 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the indexed 1-O, Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the discrepancies found - if any. A comparison report Validation Summary Report OSD/FSTC-83/175 provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL(FIPS PUB 21-1). GRA

N84-11806# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
NCR CORPORATION, NCR 19300, NCR ITX COBOL RELEASE 1.0 Validation Summary Report
13 May 1983 53 p
(PB83-241935; OSD/FSTC-83/174) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the NCR Corporation, NCR ITX COBOL Release 1.0 running under the NCR ITX Release 1.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11807# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
COMPUTER SCIENCES CORPORATION UNIVAC 1100/80, CSTS BASIC - RELEASE BAS160 Validation Summary Report
25 Apr. 1983 14 p
(PB83-237412; OSD/FSTC-83/181) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Computer Sciences Corporation, CSTS BASIC Release BAS160 running under the CSTS II Release 2 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 68). The compiler was validated against the Minimal BASIC level of FIPS PUB 68. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11808# Office of Software Development, Falls Church, Va.
DATA GENERATION CORPORATION ECLIPSE MV/8000, AOS/VS COBOL REVISION 2.14 Validation Summary Report
19 Jan. 1983 59 p refs
(PB83-237396; OSD/FCTC-82/270-Rev-2.14) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Data General Corporation, AOS/VS COBOL Revision 2.14 running under the AOS/VS Revision 1.61 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview, of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11809# National Bureau of Standards, Washington, D.C.
COMPUTER SCIENCE AND TECHNOLOGY: CARE AND HANDLING OF COMPUTER MAGNETIC STORAGE MEDIA Final Report
Sidney B. Geller Jun. 1983 129 p refs
(PB83-237271; NBS-SP-500-101; LC-83-600536) Avail: NTIS HC A07/MF A01 CSCL 09B

The physical/chemical preservation of computer magnetic storage media-principally computer magnetic tapes-and their stored data, through the application of proper care and handling methods under various conditions is addressed. The media handling methods and environmental conditions which should be instituted during the course of controllable day to day and long term archival storage activities are emphasized. Measures which can be initiated during media transit and in the aftermath of catastrophic or uncontrollable events are considered. GRA

N84-11810# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
THE TRW DATACOM AWS 246, TRW COBOL VERSION 8.0 (PRE-RELEASE) Validation Summary Report
21 Jan. 1983 77 p refs
(PB83-233981; OSD/FSTC-82/345) Avail: NTIS HC A05/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the TRW Datacom, TRW COBOL Version 8.0 (Pre-Release) running under the CTOS Version 7.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N84-11811# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
THE NCR CORPORATION, OFFICE SYSTEMS DIVISION, WS 210, NCR COBOL RELEASE 3.0 (PRE-RELEASE) Validation Summary Report
21 Jan. 1983 77 p refs

(PB83-233718; OSD/FSTC-82/340) Avail: NTIS HC A05/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the NCR Corporation, NCR COBOL Release 3.0 (Pre-Release) running under the CTOS Release 7.1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N84-11812# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.

FEED (FIELD EXPLOITATION OF ELEVATION DATA) EVALUATION Technical Progress Report, Sep. 1981 - Jun. 1982

N. L. Faust and M. J. Rowan Aug. 1983 32 p refs

(Contract DAAK70-81-F-0491)

(AD-A131318; ETL-0322) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report is an evaluation of the Field Exploitation of Elevation Data (FEED) as it relates to the expressed objectives. Software and hardware were considered. The task of the U.S. Army Engineer Topographic Laboratories (USAETL) is to develop topographic and terrain analysis products to support the functions of the Field Army. Concurrently, USAETL must evaluate and determine the form in which these products can evolve to the battlefield. The 1980-1984 Department of the Army Consolidated Topographic Support Program (DACONTSP) had expressed an interest in automated topographic support capabilities to rapidly produce terrain-related cartographic products. It is within this environment that the FEED system has been developed. GRA

N84-11813# University of Southern California, Los Angeles. Dept. of Computer Science.

A SUMMARY OF RESEARCH ON MICROPROCESSOR NETWORKS Final Technical Report

Per Brinch Hansen May 1983 8 p refs

(Contract N00014-77-C-0714; NR Proj. 048-647)

(AD-A131325) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report summarizes the achievements of research that led to the development of a new programming concept for computer networks, known as Distributed Processes. This new concept had considerable influence on the subsequent development of the programming language Ada by the Department of Defense. The goal of the research was to develop a design methodology that will make the software and hardware structure of microprocessor networks and multiprocessors simple, reliable and efficient. GRA

N84-11814# Los Alamos Scientific Lab., N. Mex.

DRAFT REMARKS FOR THE IFIPS CONGRESS 1983 PANEL ON HOW TO OBTAIN HIGH PERFORMANCE FOR HIGH-SPEED PROCESSORS

B. L. Buzbee 1983 11 p refs Presented at the 9th World Computer Congr., Paris, 19-23 Sep. 1983

(Contract W-7405-eng-36)

(DE83-012669; LA-UR-83-1389; CONF-830963-1) Avail: NTIS HC A02/MF A01

Systems of a few tightly coupled high performance processors have the potential to provide significant increases in computational capability. Realizing this potential will require development of highly parallel algorithms. These must be combined with suitable programming languages and architectures such that the overall implementation introduces little additional work relative to uniprocessor implementation. Experimental equipment will be a pacing factor in research on asynchronous systems. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N84-11815*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

THE USE OF SINGULAR VALUE GRADIENTS AND OPTIMIZATION TECHNIQUES TO DESIGN ROBUST CONTROLLERS FOR MULTILOOP SYSTEMS

Jerry R. Newsom and V. Mukhopadhyay (George Washington Univ., Washington, D.C.) Nov. 1983 10 p refs Presented at the AIAA Guidance and Control Conf., Gatlinburg, Tenn., 15-17 Aug. 1983

(NASA-TM-85720; NAS 1.15:85720) Avail: NTIS HC A02/MF A01 CSCL 09B

A method for designing robust feedback controllers for multiloop systems is presented. Robustness is characterized in terms of the minimum singular value of the system return difference matrix at the plant input. Analytical gradients of the singular values with respect to design variables in the controller are derived. A cumulative measure of the singular values and their gradients with respect to the design variables is used with a numerical optimization technique to increase the system's robustness. Both unconstrained and constrained optimization techniques are evaluated. Numerical results are presented for a two output drone flight control system. Author

N84-11816# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DIGITAL IMAGE PROCESSING [PROESSAMENTO DIGITAL DE IMAGENS]

N. D. A. Mascarenhas Sep. 1983 28 p refs In PORTUGUESE; ENGLISH summary Presented at the 6th CNMAC, Sao Jose dos Campos, Brazil, 26-30 Sep. 1983

(INPE-2873-PRE/402) Avail: NTIS HC A03/MF A01

A summary of the areas of activity in Image Processing is presented with some detailing of the used mathematical procedures. Author

N84-11817*# SRI International Corp., Menlo Park, Calif. Advanced Computer Systems Dept.

RECOMMENDATIONS FOR NASA RESEARCH AND DEVELOPMENT IN ARTIFICIAL INTELLIGENCE Final Report

David R. Brown and Peter C. Cheeseman Apr. 1983 97 p refs

(Contract NAS5-27338; SRI Proj. 4716)

(NASA-CR-170585; NAS 1.26:170585) Avail: NTIS HC A05/MF A01 CSCL 09B

Basic artificial intelligence (AI) research, AI applications, engineering, institutional management, and previously impractical missions enabled by AI are discussed. Author

N84-11818# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

DISCOURSE AND PROBLEM SOLVING

Diane Litman Jul. 1983 56 p refs

(Contract N00014-77-C-0378; Grant NSF IST-82-10564; ARPA Order 3414)

(AD-A131003; BBN-5338) Avail: NTIS HC A04/MF A01 CSCL 06/4

This report proposes a plan-based natural language system that incorporates knowledge of both plan and discourse structure of task-oriented dialogues. An initial representation of communicative (discourse) actions is discussed, in particular how to incorporate knowledge of legal moves as action effects rather than grammars. The subtle differences implicit in various surface realizations are also examined, as well as the structure of these communicative actions in actual dialogues. It is suggested that both local and global discourse structures are necessary. It is also suggested

that planning models need to be extended to include two agent plan execution. Finally, a model of the goal recognition processes is presented. Communicative and task knowledge work in parallel, one source dynamically taking control over the other and reducing the search space, depending on the kind of discourse. Communicative recognition is hypothesized to be simple, using the knowledge provided by the analysis of surface phenomena and task plan recognition. Author (GRA)

N84-11819# Miami Univ., Coral Gables, Fla. Center for Theoretical Studies.
INTERDISCIPLINARY STUDY ON ARTIFICIAL INTELLIGENCE Final Report, 15 Oct. 1982 - 14 Oct. 1983
Behram N. Kursunoglu Jul. 1983 45 p refs Presented at a Workshop on Biol. Dimensions of Artificial Intelligence, Coral Gables, Fla. 14-25 Mar. 1983
(Contract DAAG29-82-K-0198)
(AD-A131359; ARO-20126.1-AA) Avail: NTIS HC A03/MF A01 CSCL 06/4

The interdisciplinary workshop on biological dimensions of artificial intelligence was organized with a very special objective in mind. The objective was to bring together researchers working in a variety of areas directly concerned with intelligence, such as computer modeling of brain processes, experimental neurophysiology, evolutionary programming and adaptability theory, theory modeling and simulation, self-organizing systems, Biophysics of information processing, cognitive science, and traditional artificial intelligence. The objective behind this objective was to provide a vehicle for reviewing and analyzing directions of artificial intelligence from the perspective of the full range of scholarly activities relevant to this field. Some of the specifically stated objectives in the original letter of invitation suggested topics such as learning and adaptation, evolutionary algorithms for adaptive pattern recognition and motor control, the comparison of computer and biological organization, knowledge representation and the comparison of biological and computer memory, the potential role of parallelism and the physical limits of computation, and the significance of recent experimental work on biochemical and molecular switching processes inside neurons. GRA

N84-11820# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
NATURAL LANGUAGE COMMUNICATION WITH MACHINES: AN ONGOING GOAL
William A. Woods Jul. 1983 35 p refs
(Contracts N00014-77-C-0371; N00014-77-C-0378)
(AD-A131320; BBN-5375) Avail: NTIS HC A03/MF A01 CSCL 06/4

This report is concerned with issues of man-machine interaction in decision support system for high-level decision makers. It discusses components that such systems should have, what the current state of the art is with respect to such systems, and how current research in artificial intelligence is leading toward solving the remaining problems. Topics covered include natural language syntax and semantics, models of the beliefs and goals of the user, and knowledge-based helpful systems. Author (GRA)

N84-11821# Illinois Univ., Urbana. Lab. for Coordinated Science.
ARTIFICIAL INTELLIGENCE IMPLICATIONS FOR INFORMATION RETREIVAL
Gerald DeJong Apr. 1983 17 p refs Presented at the 6th Ann. Intern. ACM SIGIR Conf., Washington, 6-8 Jun. 1983
(Contract F49620-82-K-0009; AF Proj. 2304)
(AD-A131382; AFOSR-83-0658TR) Avail: NTIS HC A02/MF A01 CSCL 06/4

The field of information retrieval is already more aware than many other fields of the relevance of artificial intelligence. Nonetheless there remain exciting applications of artificial intelligence that have been so far overlooked. In this paper we will point out some of the ways artificial intelligence might influence the field of information retrieval. We will then examine one application in more detail to discover the kind of technical problems involved in its fruitful exploitation. GRA

N84-11822*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
FAULT TOLERANT OPTIMAL CONTROL Ph.D. Thesis
Howard Jay Chizeck Aug. 1982 935 p refs
(Grant NGL-22-009-124; Contract N00014-77-C-0224)
(NASA-CR-174471; NAS 1.26:174471; AD-A131383;
LIDS-TH-1260) Avail: NTIS HC A99/MF A01 CSCL 09B

This thesis considers the control of dynamic systems that experience abrupt, structural changes at random times. These changes are caused by phenomena such as component failures and repairs, and large environmental distrubances. The author proposes extensions of the well-known linear quadratic Gaussian (LOG) control methodology to systems having randomly jumping structures and parameters that are described by reliability-theoretic models. It is called the jump linear quadratic (JLQ) control problem. GRA

N84-11823# SRI International Corp., Menlo Park, Calif.
RESEARCH ON INTERACTIVE ACQUISITION AND USE OF KNOWLEDGE Interim Report, Jul. 1982 - Jan. 1983
Mark E. Stickel May 1983 30 p refs
(Contract N00039-80-C-0575)
(AD-A131306) Avail: NTIS HC A03/MF A01 CSCL 09/2

SRI International is engaged in a long-term effort under DARPA sponsorship to conduct basic research on artificial intelligence problems central to the construction of computer systems that can participate in extended dialogues in natural language with their users. A central thrust to our research is that the system be able to acquire new concepts, facts, and vocabulary through dialogues with the users. It is equally important that the system not be limited to querying for individual facts-as it is the case, for example, with database query systems. Rather this research provides a base for constructing systems that can engage in extended interactions to determine what a user intends (including when this differs from what he literally requests), and that provide responses appropriate to a particular user and discourse situation. Among the core capabilities of these systems are those for reasoning about the knowledge, goals, and plans of other agents where these other agents may be users or other computer systems. This report covers work done on the KLAUS (Knowledge-Learning and-Using System) project during the period July 1982 to January 1983. This work consisted of developing two aspects of KLAUS: the natural-language-processing component and the deduction system component. GRA

N84-11824# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
MACHINE LEARNING. PART 1: A HISTORICAL AND METHODOLOGICAL ANALYSIS Interim Report
Jaime G. Carbonell, Ryszard Michalski, S., and Tom M. Mitchell 31 May 1983 23 p refs
(Contract N00014-79-C-0661; NSF MCS-82-05166)
(AD-A131424; CMU-CS-83-135-Pt-1) Avail: NTIS HC A02/MF A01 CSCL 09/2

Machine learning has always been an integral part of artificial intelligence, and its methodology has evolved in concert with the major concerns of the field. In response to the difficulties of encoding ever-increasing volumes of knowledge in modern AI systems, many researchers have recently turned their attention to machine learning as a means to overcome the knowledge acquisition bottleneck. Part 1 of this paper presents a taxonomic analysis of machine learning organized primarily by learning strategies and secondarily by knowledge representation and application areas. A historical survey outlining the development of various approaches to machine learning is presented from early neural networks to present knowledge intensive techniques. Part II (to be published in a subsequent issue) will outline major present research directions, and suggest viable areas for future investigation. GRA

N84-11825# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
WHAT'S IMPORTANT ABOUT KNOWLEDGE REPRESENTATION

W. A. Woods Jul. 1983 31 p refs
(Contracts N00014-77-C-0371; N00014-77-C-0378)
(AD-A131280; BBN-5374) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report discusses a number of issues that serve as research goals for the discovery of general principles of knowledge representation. It is concerned with the question of what constitutes a good representational system and a good set of representational primitives to deal with an open-ended range of knowledge domains. The discussion is illustrated with techniques and concepts evolved in the development of the knowledge representation system KL-ONE. GRA

N84-11826# Ohio State Univ., Columbus. Dept. of Computer and Information Science.
EXPERT SYSTEMS: MATCHING TECHNIQUES TO TASKS
B. Chandrasekaran May 1983 20 p refs
(Grant AF-AFOSR-0255-82; AF Proj. 2304)
(AD-A131385; AFOSR-83-0660TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The major line of argument that we will pursue in this paper can be outlined as follows. In Sec. II, we briefly trace the development of the idea of knowledge-based systems in AI. Sec. III is devoted to discussing the increasing need for symbolic content to expert reasoning as the size and demands of the task domain increase; i.e., we will analyze why a complete mathematical model of the situation, even if available, will not meet many of the demands placed on expert reasoning. In Sec. IV, we discuss the several distinct senses and roles that the notion of rules can play and have played in expert systems, and how a failure to keep these separate can cause a great deal of confusion. In Sec. V, we will argue that further organizational constructs, such as concepts and types of problem solving, are needed both to construct more powerful expert systems, and to characterize their capabilities. We will also provide two examples of generic problem-solving types, and show how each type of problem-solving induces an organization of knowledge in the form of a cooperating community of specialists engaged in that problem solving type. The overall flow of the discussion is in the direction of the evolution of expert systems from numerical programs to highly organized symbolic structures engaged in distinct types of problem-solving and communicating with one another. GRA

N84-11827# Bonn Univ. (West Germany). Sondersforschungsbereich 72.
A MULTIPLE SHOOTING ALGORITHM FOR DIRECT SOLUTION OF OPTIMAL CONTROL PROBLEMS
Hans Georg Bock and Karl-Josef Plitt Apr. 1983 14 p refs Submitted for publication Sponsored by Deutsche Forschungsgemeinschaft
(Preprint-589) Avail: NTIS HC A02/MF A01

An algorithm for the numerical solution of parametrized optimal control problems which is based on multiple shooting in connection with a recursive quadratic programming technique is presented. A condensing algorithm for the solution of the quadratic subproblems and high rank update procedures, which lead to significant improvements of the convergence behavior and reductions of computing time and storage requirements are given. Numerical results for a reentry problem are reported. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N84-11828 Technische Univ., Munich (West Germany). Inst. fuer Mathematische.
PARTITIONED RUNGE-KUTTA PROCEDURES FOR NUMERICAL SOLUTION FOR NONSTIFF AND STIFF INITIAL VALUE PROBLEMS [PARTITIONIERTE RUNGE-KUTTA VERFAHREN ZUR NUMERISCHEN LOESUNG VON NICHRSTEIFEN UND STEIFEN ANFANGSWERTAUFGABEN]
Peter Rentrop Mar. 1983 99 p refs In GERMAN
(TUM-M8304; TUM-Math-03-83-M04-200/1-FMA) Copyright. Avail: Issuing Activity

A class of one-step procedures that avoid the decision whether to use stiff or nonstiff Runge-Kutta procedures for solving numerically initial value problems is given. Two algorithms are given: algorithm PRK4 declares singular components of the differential system as stiff; algorithm RKF4RW considers the total system as lither nonstiff or stiff. Partitioned Runge-Kutta procedures consist of an explicit Runge-Kutta procedure together with a semi-implicit Rosenbrock-Wanner procedure. Computer programs are written out in FORTRAN 4. Author (ESA)

N84-11829*# Osaka Univ., Toyonaka (Japan).
ON THE PROBABILITY OF UNDETECTED ERROR FOR THE MAXIMUM DISTANCE SEPARABLE CODES
Tadao Kasami and Shu Lin (Hawaii Univ., Manoa) 29 Aug. 1983 22 p refs
(Grant NAG5-234)
(NASA-CR-170604; NAS 1.26:170604) Avail: NTIS HC A02/MF A01 CSCL 12A

The performance of maximum-distance-separable codes with symbols from GF(1) when they are used for pure error detection or for simultaneous error correction and detection is investigated. These codes are good for symbol error detection. Their probability of undetected error is upper bounded by q to the -r and decreases monotonically as the symbol error probability epsilon decreases from (q-1)/q to 0, where r is the number of parity-check symbols of a code. Author

N84-11830# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A NUMERICAL METHOD FOR SOLVING BY APPROXIMATION AN ADVANCED INTEGRO-DIFFERENTIAL EQUATION [UM METODO NUMERICO PARA RESOLUCAO POR APROXIMACAO DE UMA EQUACAO INTEGRO-DIFERENCIAL DE ARGUMENTO AVANCADO]
Armando Zeferino Milioni and Paulo Renato deMorais Jul. 1983 29 p refs In PORTUGUESE; ENGLISH summary Presented at the 14th Coloquio Brasilerio de Matematica, em Pocos de Caldas, no periodo de 14 a 22/07/83
(INPE-2826-PRE/379) Avail: NTIS HC A03/MF A01

Optimally exploring and consuming a nonrenewable natural resource in the presence of uncertainties are addressed. Deshmukh and Pliska proved that the objective function, and the expected utility value of consumption minus the exploration costs, discounted over an infinite planning horizon is the unique function to satisfy an integro-differential equation and its boundary condition. This equation has been solved only for a few particular cases. The goal here is to propose two methods for obtaining an approximate numerical solution to that equation for more general cases. This approximate solution can then be used to obtain the parameters that characterize the optimal consumption and exploration policy. Author

N84-11831*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EMBEDDING METHODS FOR THE STEADY EULER EQUATIONS
Shih-Hung Chang and Gary M. Johnson Jul. 1983 12 p refs
(Grant NAG3-339)
(NASA-TM-83481; E-1803; NAS 1.15:83481) Avail: NTIS HC A02/MF A01 CSCL 12A

An approach to the numerical solution of the steady Euler equations is to embed the first-order Euler system in a second-order system and then to recapture the original solution by imposing additional boundary conditions. Initial development of this approach and computational experimentation with it were previously based on heuristic physical reasoning. This has led to the construction of a relaxation procedure for the solution of two-dimensional steady flow problems. The theoretical justification for the embedding approach is addressed. It is proven that, with the appropriate choice

of embedding operator and additional boundary conditions, the solution to the embedded system is exactly the one to the original Euler equations. Hence, solving the embedded version of the Euler equations will not produce extraneous solutions. M.G.

N84-11832*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPECTRAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS Final Report
M. Yousuff Hussaini, Craig L. Streett, and Thomas A. Zang Aug. 1983 64 p refs
(Contracts NAS1-17070; NAS1-17130)
(NASA-CR-172248; NAS 1.26:172248; Rept-83-46) Avail: NTIS HC A04/MF A01 CSCL 12A

Origins of spectral methods, especially their relation to the Method of Weighted Residuals, are surveyed. Basic Fourier, Chebyshev, and Legendre spectral concepts are reviewed, and demonstrated through application to simple model problems. Both collocation and tau methods are considered. These techniques are then applied to a number of difficult, nonlinear problems of hyperbolic, parabolic, elliptic, and mixed type. Fluid dynamical applications are emphasized. Author

N84-11833# California Univ., Davis. Signal and Image Processing Lab.
TWO DIMENSIONAL LINEAR PREDICTION MODELS. PART 1. SPECTRAL FACTORIZATION AND REALIZATION
Surendra Ranganath and Anil K. Jain May 1983 74 p refs
(Contracts DAAG29-82-K-0077; N00014-81-K-0191)
(AD-A130954; ARO-18532.3-EL; SIPL-83-5) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper presents several results for three different canonical forms of linear prediction on a plane. These filters have causal, semicausal and noncausal prediction geometries. Starting from their properties the authors consider the problem of realization of these filters from a given power spectral density function (SDF). Since it is not possible in general to obtain rational spectral factors of a two dimensional SDF, they propose algorithms for obtaining rational approximations which are stable and converge to their limit (irrational) factors as the order of approximation is increased. It is also shown that the normal equations associated with the minimum variance two-dimensional prediction filters give a useful algorithm for obtaining rational approximations which are stable and converge to their unique limit filters. This result allows design of finite order, stable filters by solving a finite number of equations while realizing the given SDF arbitrarily closely.
Author (GRA)

N84-11834# Tennessee Univ., Knoxville.
INFORMATION LOSS CAUSED BY NOISE IN MODELS FOR DICHOTOMOUS ITEMS
Fumiko Samejima 29 Nov. 1982 66 p refs
(Contract N00014-81-C-0569; RR0420401; NR Proj. 150-467)
(AD-A131369; RR-82-1-ONR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Because of the recent popularity of the three-parameter logistic model among the researchers who apply latent trait theory, it will be worthwhile to investigate the effect of noise accommodate in different models. In this paper, four types of models on the dichotomous response level, Types A, B, C and D, are considered. Type A does not include noise, and the other three types do. Observations are made as to how much total item information is lost because of the noise, how the item response information functions are affected, how the speed of convergence to the normality of the conditional distribution of the maximum likelihood estimate of ability, given a specific ability level, is affected, and so forth. Author (GRA)

N84-11835# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
NUMERICAL METHODS FOR FREE BOUNDARY PROBLEMS AND 2 PHASE FLOWS Final Report, 1 Mar. 1980 - 28 Feb. 1983
George J. Fix 19 Jul. 1983 9 p refs
(Contract DAAG29-80-C-0081)
(AD-A131374; ARO-16792.9-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This work in this project dealt with large scale scientific computing. Particular attention was given to fluid flow - both compressible and incompressible chemically reacting flows arising in combustion as well as moving boundary problems. The primary object was to develop efficient numerical methods that could be used for practical engineering problems. The research consisted in the development of appropriate variational formulations, and then inventing stable and accurate discretizations based on the variational methods. In the area of combustion this has lead to an entirely new approach which has proven effective in modelling the very complicated features of chemically reacting flows.
Author (GRA)

N84-11836# Pittsburgh Univ., Pa. Dept. of Electrical Engineering.
APPROXIMATION METHODS IN MULTIDIMENSIONAL FILTER DESIGN AND RELATED PROBLEMS ENCOUNTERED IN MULTIDIMENSIONAL SYSTEM DESIGN Final Report, 1 Jan. 1978 - 31 Jan. 1983
N. K. Bose 21 Mar. 1983 34 p refs
(Grant AF-AFOSR-3542-78; AF Proj. 2304)
(AD-A131316; AFOSR-83-0661TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The research conducted contributes towards the development of a theory to analyze and design linear shift-invariant multivariable multidimensional discrete and continuous systems. Recursive schemes to compute rational approximants to a power series in two variables having constant matrices for coefficients are developed. Approximants to special matrix power series are investigated and the properties of these approximants are delineated in a strictly mathematical setting and their implications are interpreted via physical reasonings. Algebraic procedures to test thee approximants for stability are provided, and criteria for guaranteeing the invariance of properties like positivity and stability under parameter changes or perturbation are advanced. Attention is directed throughout towards the reduction of algebraic computational complexity. In the important problem of filter stabilization without appreciable change in the magnitude of the frequency response, recent results on multiplicative computational complexity theory is exploited to demonstrate the feasibility of implementing efficiently a 2-D discrete Hilbert transform. Criteria for 2-D rational approximants to be maximally flat are obtained. GRA

N84-11837# Utah Univ., Salt Lake City. Dept. of Mathematics.
EXPLICIT, NEARLY OPTIMAL, LINEAR RATIONAL APPROXIMATION WITH PREASSIGNED POLES
Frank Stenger Feb. 1983 68 p refs
(Contract DAAG29-83-K-0012; Grant DAAG29-77-G-0139)
(AD-A131392; ARO-19297.3-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper gives explicit rational functions for interpolating and approximating functions on the intervals -1,1, 0, infinity and -infinity, infinity. The rational functions are linear in the function f to be approximated. The error of approximation of these rationals is nearly as small as the error of best rational approximation with numerator and denominator polynomials of the same degree. Regions of analyticity of f are described, which make it possible to tell a priori, the accuracy which we can expect from rational approximation. GRA

N84-11838# North Carolina State Univ., Raleigh. Dept. of Mathematics and Computer Science.
RESEARCH IN NUMERICAL LINEAR ALGEBRA AND NUMERICAL METHODS FOR LARGE-SCALE LEAST SQUARES AND OTHER PROBLEMS Final Report, 15 Jun. 1977 - 14 Jun. 1983
Robert J. Plemmons 1 Aug. 1983 9 p refs
(Contracts DAAG29-80-K-0025; DAAG29-81-K-0132; Grant DAAG29-77-G-0166)
(AD-A131400; ARO-14692.8-MA; ARO-17302.2-MA;

ARO-18663.7-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The research problems studied for the U.S. Army Research Office over the six year period of these grants are each in the research area of Numerical Linear Algebra and Applications. The objectives of the research were to develop new techniques for handling large-scale problems which involve interative or direct methods for solving large sparse systems of linear equations or least squares problems. The topics to be studied included: (1) the convergence of iterative methods for solving systems of linear equations, (2) hyperbolic systems of partial differential equations, (3) large-scale least squares computations, (4) M-matrices and related topics on nonegativity, (5) the computation of stationary distributions for Markov chains and (6) sparse matrix computations in structural optimization. Research on these topics was to be coordinated with associated scientists and engineers from some of the application areas such as queueing network analysis, compartmental analysis of biological systems, geodetic adjustment methods and structural analysis. Some theoretical research was to be done and certain algorithms and software were to be developed and tested on real problems from these areas. GRA

N84-11839# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

SCALING THEOREMS FOR ZERO-CROSSINGS

A. L. Yuille and T. Poggio Jun. 1983 46 p refs

(Contract N00014-80-C-0505)

(AD-A131599; AI-M-722) Avail: NTIS HC A03/MF A01 CSCL 12/1

The authors characterize some properties of the zero-crossings of the laplacian of signals - in particular images - filtered with linear filters, as a function of the scale of the filter. They prove that in any dimension the only filter that does not create zero-crossings as the scale increases is the Gaussian. This result can be generalized to apply to level-crossings of any linear differential operator: it applies in particular to ridges and ravines in the image intensity. In case of the second derivative along the gradient it is proved that there is no filter that avoids creation of zero-crossings. GRA

N84-11840# California Univ., Los Angeles. Center for Plasma Physics and Fusion.

SOLUTIONS OF A 4TH ORDER DIFFERENTIAL EQUATION DESCRIBING MODE CONVERSION IN A MAGNETIZED PLASMA

J. E. Maggs, Alfredo Banos, Jr., and G. J. Morales Jun. 1983 64 p refs

(Contract N00014-80-C-0373)

(AD-A131600; PPG-722) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper investigates the solutions of a fourth order differential equation which arises in the description of high frequency electrostatic waves near plasma resonance in a magnetized plasma with a zero order density gradient along the magnetic field. The behavior of the electrostatic potential is described by Poisson's equation. GRA

N84-11841# Lincoln Lab., Mass. Inst. of Tech., Lexington.

MEAN-SQUARE OPTIMAL, FULL-ORDER COMPENSATION OF STRUCTURAL SYSTEMS WITH UNCERTAIN PARAMETERS

David C. Hyland 1 Jun. 1983 122 p refs

(Contract F19628-80-C-0002; AF Proj. 649L)

(AD-A131276; ESD-TR-83-013; TR-626) Avail: NTIS HC A06/MF A01 CSCL 12/1

The minimum information approach to active control of structural systems seeks inherently robust designs by use of mean square optimization conjoined with a stochastic system model which presumes as little as possible regarding a priori information on modal parameter statistics. This report extends earlier results for the regulator problem to the case of full-order dynamic compensation with nonsingular observation noise. Optimality conditions along with sufficient conditions for existence and uniqueness of solutions and for closed-loop stochastic stability are presented. Results concerning asymptotic properties for large uncertainty levels are also given. Numerical results for various simple examples indicate improved robustness properties over standard LQG designs and suggest the possibility that, under the minimum information stochastic approach, the burden of design computation may be reduced to that associated with the relatively well known or coherent modes. Author (GRA)

N84-11842# Science Applications, Inc., Pleasanton, Calif.

MOVING FINITE ELEMENTS IN 2-D Annual Report, 8 Jun. 1982 - 7 Jun. 1983

Robert J. Gelinas 3 May 1983 28 p refs

(Contract F49620-81-C-0073; AF Proj. 2304)

(AD-A131279; SAI-PL/MFE-2D-2-83; AFOSR-83-0623TR; AR-2)

Avail: NTIS HC A03/MF A01 CSCL 12/1

In this second year of effort, truly large-scale computing aspects of PDE's (partial differential equations) have been addressed. MFE (moving finite element) node movement properties of highly sheared fluid flows and shocks were studied. The following results were obtained: (1) extremely large nodal savings were obtained by the MFE method in highly sheared shock examples; (2) such ODE solvers as the Gear method require significant restructuring of their internal code logic in order to achieve improved time step and error-controlling policies in PDE applications; (3) iterative linear solvers are required in order to accommodate large MFE grid meshes; (4) a new iterative solver of linear systems was developed in order to attain large convergence rates in advection-diffusion equations with highly inhomogeneous mesh spacings, which cannot be solved satisfactorily with other existing linear solvers; (5) first-generation regularization schemes resolved highly sheared flows; and, although large grid aspect ratios were resolved successfully, new regularization functions which homogenize MFE grid cells should be developed in future work; and (6) singularities which are frequently troublesome in cylindrical and spherical co-ordinates are eliminated naturally in MFE inner product formulations. Author (GRA)

N84-11843# Texas A&M Univ., College Station. Dept. of Statistics.

TIME SERIES MODEL IDENTIFICATION BY ESTIMATING INFORMATION, MEMORY AND QUANTILES

Emanuel Parzen Jul. 1983 72 p refs

(Contract DAAG29-83-K-0051)

(AD-A131155; A-22) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper applies techniques of Quantile Data Analysis to non-parametrically analyze time series functions such as the sample spectral density, sample correlations, and sample partial correlations. The aim is to identify the memory type of an observed time series, and thus to identify parametric time domain models that fit an observed time series. Time series models are usually tested for adequacy by testing if their residuals are white noise. It is proposed that an additional criterion of fit for a parametric model is that it have the non-parametrically estimated memory characteristics. An important diagnostic of memory is the index delta of regular variation of a spectral density; estimators are proposed for delta. Interpretations of the new quantile criteria are developed through cataloging their values for representation time series. The model identification procedures proposed are illustrated by analysis of long memory series simulated by Granger and Joyeux, and the airline model of Box and Jenkins. Author (GRA)

N84-11844# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Science.

ROBUST LINEAR FILTERING FOR MULTIVARIABLE STATIONARY TIME SERIES

Haralampos Tsaknakis and P. Papantoni-Kazakos Apr. 1983 69 p refs

(Grant AF-AFOSR-3695-78; AF Proj. 2304)

(AD-A131209; AFOSR-83-0684TR; TR-83-6) Avail: NTIS HC A04/MF A01 CSCL 12/1

The problem of asymptotic, non-causal linear filtering for statistically contaminated multivariable stationary time series is considered. The spectra of both the signal and the noise components of the observation process are assumed to belong to

certain convex and compact classes. The minimax criterion of optimality is adopted, and for some specific spectral classes the corresponding solutions are found. The performance of those solutions is studied, where the performance criteria used are efficiency, error variation within the classes and breakdown curves or points. Some examples are studied quantitatively. GRA

N84-11845# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ANALYSIS OF A DELAYED DELTA MODULATOR
Neil L. Gerr and Stamatis Cambanis May 1983 49 p refs
(Contract F49620-82-C-0009; AF Proj. 2304)
(AD-A131208; AFOSR-83-0683TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Delayed Delta Modulation (DDM) uses a second feedback loop in addition to the standard DM loop. While the standard loop compares the current predictive estimate of the input to the current sample, the new loop compares it to the upcoming sample so as to detect and anticipate slope overloading. Since this future sample must be available before the present output is determined and the estimate updated, delay is introduced at the encoding. The performance of DDM with perfect integration and step-function reconstruction is analyzed for each of three inputs. In every case, the stochastic stability of the system is established. For a discrete time i.i.d input, the (limiting) joint distribution of input and output is derived, and the (asymptotic) mean square sample point error MSE(SP) is computed when the input is Gaussian. For a Wiener input, the joint distribution of the sample point and predictive errors is derived, and MSE(SP) and the time-averaged MSE (MSE(TA)) are computed. For a stationary, first-order Gauss-Markov input, the joint distribution of input and output is derived, and MSE(SP) and MSE(TA) computed. Graphs of the MSE's illustrate the improvement attainable by using DDM instead of DM. With optimal setting of parameters, MSE(SP) (MSE(TA) is reduced about 15% (35%). Author (GRA)

N84-11846# Missouri Univ., Rolla. Dept. of Mathematics and Statistics.
ROBUST ESTIMATES OF ORDERED PARAMETERS Interim Report
Rhonda Magel (Texas Univ.) and F. T. Wright Sep. 1982 19 p refs
(Contract N00014-80-C-0322)
(AD-A131204) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors the estimation of a collection of location parameters when it is believed, a priori, that their ordering is known. The least squares and least absolute deviations estimates subject to this ordering restriction have been studied in the literature. They seek robust estimators which perform well for a broad range of distributions. The results of a Monte Carlo study and a study of computation algorithms are discussed. GRA

N84-11847# Colorado Univ., Boulder. Dept. of Computer Science.
QUASI-NEWTON METHODS USING MULTIPLE SECANT EQUATIONS
Robert B. Schnabel Jun. 1983 41 p refs
(Contract DAAG29-81-K-0108)
(AD-A131444; CU-CS-247-83; ARO-18197.4-MA) Avail: NTIS HC A03/MF A01

The author investigated quasi-Newton methods for unconstrained optimization and systems of nonlinear equations where each approximation to the Hessian or Jacobian matrix obeys several secant equations. For systems of nonlinear equations, this work is just a simplification and generalization of previous work by Barnes and Gay and Schnabel. For unconstrained optimization, the desire that the Hessian approximation obey more than one secant equation may be inconsistent with the requirements that it be symmetric. Presented are very simple necessary and sufficient conditions for there to exist symmetric, or symmetric and positive definite, updates that obey multiple secant equations. If these conditions are satisfied, one can derive generalizations of all the standard symmetric updates, including the PSB, DFP, and BFGS, that satisfy multiple secant equations. The author shows how to successfully specify multiple secant equations for unconstrained optimization, and that algorithms using these secant equations and the generalized PSB, DFP or BFGS updates are locally and q-superlinearly convergent under standard assumptions. GRA

N84-11848# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ON THE DISTRIBUTION OF THE STUDENTIZED MAXIMUM OF EQUALLY CORRELATED NORMAL RANDOM VARIABLES
Shanti S. Gupta, S. Panchapaksan, and Joong K. Sohn Aug. 1983 36 p refs
(Contract N00014-75-C-0455)
(AD-A131529; TR-83-31) Avail: NTIS HC A03/MF A01

Let X1,...,Xk have a joint k-variate normal distribution with zero means, common unknown variance squared sigma and known correlation matrix (rho ij), where rho ij equal rho for all i does not equal j. Let s squared be distributed independently of the Xi such that upsilon s2/squared sigma has a chi-squared distribution with epsilon degrees of freedom. Some basic theoretical results are given in Section 2. The next section describes Hartley's results for approximating the distribution function of gamma. Besides a brief review of existing tables (Section 4), the paper discusses the construction of new tables based on Hartley(s) results (Section 5) and some specific applications (Section 6). GRA

N84-11849# Los Alamos Scientific Lab., N. Mex.
MOMENTUM-CONTROL VOLUMES FOR FINITE-DIFFERENCE CODES
L. G. Margolin and B. D. Nichols 1983 12 p refs Presented at 3rd Intern. Conf. on Numerical Methods in Laminar and Turbulent Flow, Seattle, 8 Aug. 1983
(Contract W-7405-eng-36)
(DE83-007566; LA-UR-83-524; CONF-830803-3) Avail: NTIS HC A02/MF A01

The integration of the Navier-Stokes equations in finite-difference codes considered. The surface-integral technique is described using momentum-control volumes. The problem of the spherical expansion of a gas is focused on. The difference equations are analyzed to see why the numerical calculation does not preserve spherical symmetry. General, yet simple, techniques for reducing the errors that break the symmetry are proposed. Numerical results are proposed to demonstrate the utility of these techniques. Finally, questions of accuracy and stability of the integration of nonuniform meshes are considered. DOE

N84-11850# Stanford Linear Accelerator Center, Calif.
APPLICATION OF THE GREEN'S FUNCTION METHOD TO SOME NONLINEAR PROBLEMS OF AN ELECTRON STORAGE RING. PART 1. THE GREEN'S FUNCTION FOR THE FOKKER-PLANCK EQUATION
S. Kheifets Jul. 1982 14 p refs
(Contract DE-AC03-76SF-00515)
(DE83-014829; PEP-NOTE-372) Avail: NTIS HC A02/MF A01

Part I of this work consists of the formal solution of the Fokker-Planck equation in terms of its Green's function and describing the Green's function itself. The Green's function and the description of some of its properties can be found in the Appendices. It discusses the distribution function in the transverse phase space of a particle and it's Fokker-Planck equation for a simple case of a weak focussing machine. The Green's function and solution of this equation are described. Then, this technique is applied to a strong focusing machine and finally there is a discussion of applicability of this method, its limitations and relation to other methods (such as the Hamiltonian method). DOE

N84-11851# Sandia Labs., Albuquerque, N. Mex.
COMPUTATION OF BESSEL FUNCTIONS OF COMPLEX ARGUMENT AND LARGE ORDER
D. E. Amos May 1983 24 p refs
(Contract DE-AC04-76DP-00789)
(DE83-014463; SAND-83-0643) Avail: NTIS HC A02/MF A01

Computer implementation of uniform asymptotic expansions of Olver for H/sub nu//sup (1)/(z), H/sub nu//sup (2)/(z), I/sub

nu/(z), J/sub nu/(z) and K/sub nu/(z) for nu (FEMALE) infinity is discussed for the right half complex plane Re z greater than or equal to 0. Analytic continuation formulae applied to the right half z plane continue these functions to the cut plane -(LC OMEGA) < arg z less than or equal to (LC OMEGA). The object of this study is to manipulate these expansions into forms suitable for numerical evaluation. The utility comes about because small errors are obtained at relatively small orders with computer costs which decrease with increasing order. It is therefore reasonable to expect that the efficiency of a general computing package can be enhanced by a proper implementation of formulae of this kind. DOE

N84-11852# California Univ., Livermore. Lawrence Livermore Lab.

LLNL BASIC ENERGY SCIENCES PROGRAM IN NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS

1983 37 p

(Contract W-7405-eng-48)

(DE83-016531; UCID-19858-83) Avail: NTIS HC A03/MF A01

In the past, numerical methods were shifted from machine to machine with only minor changes. Consequently, the power of new computers was only partially exploited. Because the numerical models within the DOE are so compute bound, every machine cycle must be accounted for. At LLNL, the BES effort is to develop entirely new numerical methods better suited to the computing architecture with some or no concern with their compatibility with techniques used in existing computing codes. The goal is to generate a new set of numerical techniques, comparable with each other, which are well suited to future machine architectures and which embody the many advances of the last decade in the field of numerical analysis. The partial differential equations under study at LLNL are time dependent and arise from hydrodynamics, electrodynamics, magnetohydrodynamics, transport, and molecular dynamics. Currently, the equations fall into the mathematical categories of nonlinear hyperbolic and linear parabolic systems. DOE

N84-11853# Oak Ridge National Lab., Tenn. Computer Sciences.

SOLUTION OF SPARSE UNDERDETERMINED SYSTEMS OF LINEAR EQUATIONS

Alan George (Waterloo Univ.), Michael T. Heath, and Esmond Ng (Waterloo Univ.) Jul. 1983 16 p refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (Contract W-7405-eng-26)

(DE83-016460; ORNL/CSD-121) Avail: NTIS HC A02/MF A01

The problem of computing the minimum-norm solution to a sparse, underdetermined system of linear equations is considered. An algorithm is developed which is based on orthogonal factorization. The algorithm is generalized to cope with systems which are rank deficient, inconsistent, or require column updating. DOE

N84-11854# Stanford Univ., Calif. Lab. for Systems Optimization.

COMPUTATIONAL EXPERIENCE WITH THE OCTAHEDRAL ALGORITHM AND RELATED RESULTS

Mark N. Broadie Jul. 1983 30 p refs

(Contracts DE-AT03-76ER-72018; DE-AM03-76SF-00326; Grants NSF MCS-79-26009; NSF ECS-80-12974; NSF MCS-81-21838) (DE83-015834; DOE/ER-72018/T10; SOL-83-8) Avail: NTIS HC A03/MF A01

This paper investigates the computational efficiency of the octahedral algorithm of Wright. The algorithm avoids a subdivision of the full product space (R/sup n/ x [0,1]; in particular, only 2n artificial vertices are required. The algorithm can be interpreted as a variable dimension algorithm in which simplices in R/sup n/ of varying dimension are traversed. There are 2/sup n/ directions (rays) where efficient one-dimensional pivots are permitted. These and other features make the octahedral algorithm a promising new method for computing fixed points. The algorithm can be interpreted as dual to the cubical algorithm of Van der Laan and Talman [1981], see Wright [1981]. Their cubical algorithm which has 2n-rays is based on C/sup n/, the n-dimensional unit cube, which is dual to O/sup n/. A concise description is presented of the octahedral algorithm and the replacement (pivot) rules which are necessary to implement the algorithm are given. Computational results are given and shortest paths through the octahedral subdivision are derived. DOE

N84-11855*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A NEW ALGORITHM FOR CONSTRAINED NONLINEAR LEAST-SQUARES PROBLEMS, PART 1

R. J. Hanson (Sandia National Labs.) and F. T. Krogh Jul. 1983 26 p refs

(NASA-CR-174480; NAS 1.26:174480; DE83-016773; SAND-83-0936-Pt-1) Avail: NTIS HC A03/MF A01

A Gauss-Newton algorithm is presented for solving nonlinear least squares problems. The problem statement may include simple bounds or more general constraints on the unknowns. The algorithm uses a trust region that allows the objective function to increase with logic for retreating to best values. The computations for the linear problem are done using a least squares system solver that allows for simple bounds and linear constraints. The trust region limits are defined by a box around the current point. In its current form the algorithm is effective only for problems with small residuals, linear constraints and dense Jacobian matrices. Results on a set of test problems are encouraging. DOE

N84-11856# Instituut TNO voor Werktuigkundige Constructies, Delft (Netherlands).

OPTIMIZATION OF CONSTRUCTIONS BY MEANS OF THE FINITE ELEMENT METHOD [OPTIMALISERN VAN CONSTRUCTIES M.B.V. DE EINDICE ELEMENTEMETHODE]

M. J. J. M. Leemans Aug. 1982 19 p In DUTCH; ENGLISH summary

(Contract A82/KM/030)

(IWECO-5071303-82-2; TDCK-77632) Avail: NTIS HC A02/MF A01

The optimization of constructions by the finite element method is explained and linear programming implementation in the computer program OPTIMA is discussed. A clamped beam and flat plate, diagonally loaded in tension are optimized. The examples show that this optimization is very powerful and can be applied to arbitrary constructions using an arbitrary object function and arbitrary design variables and boundary conditions. Author (ESA)

N84-11857 California Univ., Santa Barbara.

BOUNDARY BEHAVIOR OF HARMONIC FUNCTIONS Ph.D. Thesis

Mark Randall Huffman 1982 52 p

Avail: Univ. Microfilms Order No. DA83-12693

The open unit disk in the complex plane is given a group structure, and several relationships between this group, interpolating sequences, and the interpolating sets of Gerber and Weiss (interpolating sets are essentially delta neighborhoods in the pseudohyperbolic metric of interpolating sequences) are obtained. The right translation map corresponding to any particular element of the group preserves pseudohyperbolic distances, in fact, a linear fractional transformation of the unit disk onto itself. The main result is that any harmonic function f on the opin unit disk which is the Poisson extension of a function of bounded mean oscillation on the unit circle has the following property. If g is defined to be any particular left translate of f minus f itself, then g extends continuously to the maximal ideal space of the Banach algebra of all bounded, analytical functions on the open and disk, and the value to which g extends at any trivial point is zero. Dissert. Abstr.

N84-11858 Pittsburgh Univ., Pa.

ANALYSIS OF FINITE DIFFERENCE DISCRETIZATIONS OF NAVIER-STOKES PROBLEMS ON MAPPED DOMAINS Ph.D. Thesis

John Henry Ellison 1982 145 p

Avail: Univ. Microfilms Order No. DA83-12499

The numerical solution of two-dimensional, transient, incompressible Navier-Stokes problems on rather arbitrary bounded simply-connected regions is considered. Finite difference methods typically require a stair-step approximation to curved or sloped boundaries. To avoid this, a C(2) mapping is applied to the domain which transforms the given Navier-Stokes problem to an associate problem on a more regular domain, such as a square. A new finite difference discretization is constructed for this transformed problem. It has a nearest-neighbor stencil, and its unconditional stability is proven. A function is formed which interpolates to the finite difference solution at the mesh points. Letting the mesh gauge approach zero through a sequence of values, it is proven that a subsequent of the sequence of such interpolating functions converges weakly to a weak solution of the transformed Navier-Stokes problem. Since the weak solution is known to be unique in two dimensions, the convergence of the entire sequence is established. In using a finite difference or finite element method to solve a fluid flow pattern with non-homogeneous boundary conditions, care must be taken in applying the boundary conditions. This problem and two methods to treat it are described for the finite difference scheme which was developed. Dissert. Abstr.

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N84-11859# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Science.
ROBUST PREDICTION AND INTERPOLATION FOR VECTOR STATIONARY PROCESSES
Haralampos Tsaknakis, Dimitri Kazakos, and P. Papantoni-Kazakos Nov. 1982 39 p refs
(Grant AF-AFOSR-0030-82; AF Proj. 2304)
(AD-A130973; EECS-TR-82-7; AFOSR-83-0448TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Asymptotic linear prediction and interpolation, for statistically contaminated vector stationary processes is considered. Both prediction and interpolation are then formalized as stochastic games with saddle point solutions. The existence of unique solutions on convex and closed classes of vector stationary processes is shown. Then, those solutions are found and analyzed, for two specific classes of vector stationary processes.
Author (GRA)

N84-11860# Rome Air Development Center, Griffiss AFB, N.Y.
PROBABILITY EXPRESSIONS, WITH APPLICATIONS TO FAULT TESTING IN DIGITAL NETWORKS M.S. Thesis - Syracuse Univ.
Warren H. Debany, Jr. Mar. 1983 101 p refs
(AF Proj. 2338)
(AD-A131367; RADC-TR-83-83) Avail: NTIS HC A06/MF A01 CSCL 12/1

Logical functions are usually described in terms of Boolean Expressions. In this report we employ an alternate representation for logical functions, namely in terms of Probability Expressions (P-exps). P-exps are algebraic expressions that yield the probability that an output signal takes the logical value 1, given the independent probabilities that the input signals take the value 1. In a manner similar to signal representation in time and frequency domains, we may represent logical functions in two domains: Boolean and Probabilities domains. In this report we review and present some properties of P-exps. Computational aspects of P-exps are discussed extensively, including difficulty of computer manipulation, lengths of P-exps, solution of P-exps, and transformations between the two domains. P-exps provide a computational savings in certain classes of problems. P-exps are then applied to the problem of test generation for combinational networks. Further, we derive some results concerning the random testing of combinational networks. GRA

N84-11861# School of Aerospace Medicine, Brooks AFB, Tex. Biomathematics Modeling Branch.
MATCHED SURVIVAL ANALYSIS (MSURV) Final Report, Jun. 1981 - Mar. 1983
Joel E. Michalek, Daniel Mihalko (Nebraska Univ.), and Thomas J. White May 1983 17 p refs
(AF Proj. 2726)
(AD-A131337; USAFSAM-TR-83-15) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report documents a statistical package (MSURV) designed to analyze matched observations which are subject to arbitrary right censorship. The input data are assumed to arise from a matched survival study, in which cases are matched to controls with respect to variables suspected of being confounders. MSURV features: life table output for cases and controls; Kaplan-Meier survival curve estimates, and confidence bands for cases and controls with plotting option; linear rank tests for comparing cases and controls; and a test for comparing cases and/or controls with a life table distribution. Author (GRA)

N84-11862# School of Aerospace Medicine, Brooks AFB, Tex. Biomathematics Modeling Branch.
LINEAR RANK PROCEDURES FOR MATCHED OBSERVATIONS Final Report, 1 Jan. 1981 - 19 Feb. 1982
Joel E. Michalek and Daniel Mihalko (Nebraska Univ.) Jun. 1983 16 p refs
(AF Proj. 2726)
(AD-A131338; USAFSAM-TR-83-16) Avail: NTIS HC A02/MF A01 CSCL 12/1

General procedures are developed for matched designs in which the observations are subject to censorship on the right. The asymptotic distributions of these procedures are presented and proved. Various special cases are compared by Monte Carlo simulation. These methods are particularly applicable to epidemiological matched survival studies in which each case is matched to several controls. Author (GRA)

N84-11863# Brown Univ., Providence, R. I. Div. of Applied Mathematics.
NONPARAMETRIC ESTIMATION BY THE METHOD OF SIEVES Final Technical Report, 1 Jun. 1980 - 31 May 1983
Stuart Geman and Donald E. McClure Jul. 1983 62 p refs
(Contract DAAG29-80-K-0006)
(AD-A131394; RPA-131) Avail: NTIS HC A04/MF A01 CSCL 12/1

The research project has built a theoretical foundation for using the method of sieves to adapt classical estimation principles such as maximum likelihood and least squares to problems with infinite dimensional parameter spaces. The first results about consistency of cross validated estimators of density functions have been obtained. The method of sieves and the principle of maximum likelihood have been used to develop algorithms for digital image processing. Specific applications include image segmentation, reconstruction methods for tomography, image registration methods for moving objects, and surface restoration algorithms.
Author (GRA)

N84-11864# Stanford Univ., Calif. Dept. of Statistics.
TESTS FOR EXPONENTIALITY WHEN ORIGIN AND SCALE PARAMETERS ARE UNKNOWN
John Spinelli and Michael A. Stephens 2 Aug. 1983 27 p refs (Contract N00014-76-C-0476)
(AD-A131377; TR-336) Avail: NTIS HC A03/MF A01 CSCL 12/1

Several methods are examined for testing for the exponential distribution, when both the scale and location parameters are unknown. Percentage points are given for EDF (Empirical Distribution Function) tests, in which both parameters are estimated from the data, and the tests are compared for power with EDF tests where only the scale parameter is unknown. In addition, power studies are reported to compare these tests with other goodness-of-fit techniques for the exponential distribution, particularly those

based on regression methods, and it is found that the EDF statistics W sub 2 and A sub 2 have overall good power properties. GRA

N84-11865# Army Materials and Mechanics Research Center, Watertown, Mass.
SIMPLE PROBABILITY FUNCTIONS WITH FINITE DISTRIBUTION LIMITS: THE RADICAL FUNCTIONS Final Report
Reinier Beeuwkes, Jr. Mar. 1983 32 p
(DA Proj. 1L1-61102-AH-42)
(AD-A131576; AMMRC-TR-83-15) Avail: NTIS HC A03/MF A01 CSCL 12/1

A simple and flexible type of cumulative probability functions, here called Radical Functions, is introduced to cope with the problem of cutoff and the form of probability function in the regions near cutoff. The importance of these regions for reliability calculations is kept in sight by making indices of these regions' parameters of the function along with the maximum slope, an easily observable quality index of the material. The functions are of the inverse type delta = f(p) rather than p = f(delta) and are made up of terms in fractional powers of probability p and 1 p. They are developed so that, near cutoffs, the probabilities change in proportion to a selectable power of distance from cutoff. To exemplify their flexibility in matching a wide range of experimental data, a simple Radical function is matched to the general Weibull function. Author (GRA)

N84-11866# Iowa Univ., Iowa City. Dept. of Statistics and Acturial Science.
A MEASURE OF THE CONFORMITY OF A PARAMETER SET TO A TREND: THE PARTIALLY ORDERED CASE Interim Report
Tim Robertson and F. T. Wright (Missouri Univ.) May 1983 16 p refs
(Contracts N00014-80-C-0321; N00014-80-C-0322)
(AD-A131214) Avail: NTIS HC A02/MF A01 CSCL 12/1

Inferences concerning order restrictions on a collection of parameters are considered with the order restrictions of a form. Clearly, some parameter sets conform more closely to these order restrictions than others. The authors interested in measures of the degree of conformity. Some of the measures available in the literature for the totally ordered case are generalized to the partially ordered case and the theory developed is applied to several tests of order restricted hypotheses. GRA

N84-11867# Missouri Univ., Rolla. Dept. of Mathematics and Statistics.
TESTS FOR AN INCREASING TREND IN THE INTENSITY OF A POISSON PROCESS: A POWER STUDY Interim Report
Lee J. Bain, Max Engelhardt, and F. T. Wright Jun. 1983 17 p refs
(Contract N00014-80-C-0322)
(AD-A131213) Avail: NTIS HC A02/MF A01 CSCL 12/1

A number of tests are compared for testing the hypothesis of a constant intensity against the alternative of an increasing intensity function in a nonhomogeneous Poison process (NHPP). The powers of the tests are determined by Monte Carlo simulation against alternatives which are increasing at an exponential rate, a power rate (Weibull intensity), and a logarithmic rate. A few exact powers are also obtained. The study includes the well known Laplace test statistic which is known to be appropriate against exponentially increasing alternatives, the most powerful test for the shape parameter in a Poisson process with Weibull intensity, the likelihood ratio test against arbitrary NHPP alternatives, two nonparametric tests for trends based on Kendall's tau and Spearman's rho, and a test based on an F-statistic. Author (GRA)

N84-11868# Missouri Univ., Rolla. Dept. of Mathematics and Statistics.
TESTS FOR AND AGAINST TRENDS AMONG POISSON INTENSITIES Interim Report
Rhonda Magel (Texas Univ.) and F. T. Wright Nov. 1982 16 p refs
(Contract N00014-80-C-0322)
(AD-A131212) Avail: NTIS HC A02/MF A01 CSCL 12/1

Suppose one observes independent Poisson processes with unknown intensities lambda sub: i = 1,2,...,k, and that apriori it is believed that these intensities satisfy a known ordering. For preliminary analysis, it might be desirable to test for homogeneity among the intensities and, of course, one would want a test that utilizes the information in the ordering. Let t sub i denote the length of time for which the ith process was observed. The case in which the t sub i are equal has been studied in the literature. We develop the conditional likelihood ratio test for arbitrary t sub i are equal has been studied in the literature. We develop the conditional likelihood ratio test for arbitrary t sub i. This test is equivalent to the unconditional likelihood ratio test, but leads to an interesting multinomial testing situation, i.e. testing for homogeneity of p sub i/t sub i versus a trend among the p sub i/t sub i, where the p sub i are the cell probabilities. If the number of trials in the multinomial setting, or the total number of occurrences in the Poisson processes, is large, then the test statistic has an approximate chi-bar-squared distribution which has been studied in the literature. Results of a Monte Carlo study comparing this test with the maximin test developed by Y. J. Lee are discussed. Similar results are also obtained for testing the null hypothesis that the intensities satisfy the prescribed ordering. Author (GRA)

N84-11869# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
SELECTION PROCEDURES FOR OPTIMAL SUBSETS OF REGRESSION VARIABLES
Shanti S. Gupta, Deng-Yuan Huang (National Taiwan Normal Univ.), and C. L. Chang (National Taiwan Normal Univ.) Jul. 1983 13 p refs
(Contract N00014-75-C-0455)
(AD-A131567; TR-83-29) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper deals with selection of an optimal subset of variables in a linear regression model. Based on the criterion of expected residual mean squares, we reject inferior regression models. The derivation of the rule is different from those of the earlier papers in that here we use the simultaneous tests of a family of hypotheses. Using real data, an example is provided to illustrate the application of the proposed procedure. Author (GRA)

N84-11870# Pacific Northwest Lab., Richland, Wash.
APPLIED EXTREME-VALUE STATISTICS
R. R. Kinnison May 1983 204 p refs
(Contract DE-AC06-76RL-01830)
(DE83-013347; PNL-4690) Avail: NTIS HC A10/MF A01

Several recent articles and the necessary statistical background so that the non-statistician scientist can recognize an extreme value problem when it occurs in his work, be confident in handling simple extreme value problems himself, and know when the problem is statistically beyond his capabilities and requires consultation are presented. DOE

N84-11871# Pacific Northwest Lab., Richland, Wash.
TRAN-STAT (STATISTICS FOR ENVIRONMENTAL STUDIES) NO. 20, MAY 1982
Richard O. Gilbert and Gary C. White (LASL) Jul. 1983 32 p refs
(Contracts DE-AC06-76RL-01830; W-7405-ENG-36)
(DE83-015096; PNL-SA-10433) Avail: NTIS HC A03/MF A01

An overview is presented, with examples, introducing the statistics and mathematics of modeling with nonlinear regression functions. Nonlinear regression is becoming important in the prediction of environmental impacts using computer models. DOE

N84-11872# Hochschule der Bundeswehr, Munich. (West Germany). Forschungsschwerpunkt Simulation und Optimierung Deterministicher und Stochastischer Dynamischer Systeme.
COMPUTATION OF THE SAMPLE RANGE IN PRESENCE OF CONDITIONS ON GENERALIZED VARIANCE [DIE BERECHNUNG DES STICHPROBENUMFANGES BEI FORDERUNGEN AN DIE GENERALISIERTE VARIANZ]
Franz Schenkl and Heinz Zehle Jun. 1983 126 p refs In

GERMAN
Avail: NTIS HC A07/MF A01

Conditions of generalized variance which determine the covariance matrix in multidimensional analysis are discussed. Analogies with the exactness conditions in the sampled mean in one dimensional stochastic problems are underlined. The sample range is calculated using the relative confidence domain and the distribution function F sub N of the product of n independent variables, each of which follows the chi squared law. The FORTRAN programs used are given. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N84-11873 Virginia Polytechnic Inst. and State Univ., Blacksburg.
PARAMETER IDENTIFICATION AND CONTROL OF DISTRIBUTED-PARAMETER SYSTEMS Ph.D. Thesis
Haim Barun 1981 125 p
Avail: Univ. Microfilms Order No. DA8210374

Two methods, one for the identification and one for the control implementation of distributed parameter systems are presented. The methods are designed to identify and control the actual distributed system, without resorting to discretization. In the identification process, the eigenvalues and eigenfunctions of the distributed parameter system are identified first using an extension of a time domain approach developed for discrete systems. Next, the parameters contained in the equations of motion are identified. The motion of distributed systems is described in terms of partial differential equations, so that these parameters are continuous functions of the spatial variables. The control system design is based on the concept of independent modal space control. When discrete actuators are used, the method requires that the number of actuators be equal to the number of controlled modes. It is shown that when the independent modal space control method is used, the energy required to control the controlled modes does not depend on the actuators locations, so that the placement of the actuators does not represent a serious problem.Dissert. Abstr.

N84-11874# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SYSTEMS DYNAMICS: RECENT TECHNICAL ADVANCES AND CURRENT PROJECTS [DINAMICA DE SISTEMAS: AVANCOS TECNICOS RECENTES E PROJETOS EM CURSO]
Raul da Silva Andrade Aug. 1983 9 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC, Belem, Para, Brazil, Jul. 1983
(INPE-2846-PRE/388) Avail: NTIS HC A02/MF A01

Fundamentals of the system dynamics method are considered and its use in understanding the social and macro-economic problem in Brazil is explored. A.R.H.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N84-11875# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
INTRODUCTION TO FUZZY DECISION RULES Ph.D. Thesis [INDUCAO DE REGRAS DE DECISAO NEBULOSAS]
Orion deOliveira Silva Aug. 1983 146 p refs In PORTUGUESE; ENGLISH summary
(INPE-2855-TDL/143) Avail: NTIS HC A07/MF A01

Results found scattered in the literature are presented, covering topics in inductive logic, in the theory of fuzzy sets, including entropic measures, and in the relationship between fuzzy and multivalued logic. The presentation in uniform, with examples and comments, and some results obtained in the study of the decision rule induction problem are presented. Applications to agricultural productivity and medical diagnostics are also presented. The problem is taken as presented by Larson and Michalski, with extensions proposed by the author, based on the nature of rule's premises and conclusion (boolean or fuzzy ones). Author

N84-11876# Pennsylvania State Univ., University Park. Applied Research Lab.
APPLICATIONS OF HILBERT SPACE THEORY TO OPTIMAL AND ADAPTIVE SPACE-TIME PROCESSING Ph.D. Thesis
Guy R. L. Sohie Aug. 1983 165 p refs
(Contract N00024-79-C-6043)
(AD-A131401; ARL/PSU/TM-83-39) Avail: NTIS HC A08/MF A01 CSCL 09/4

The theory of optimal and adaptive space-time processing is developed from a fundamental and unified point of view. Because of its general nature and its geometric interpretations, an operator-theoretic approach in a Hilbert space is used. Based on measure theory in a Hilbert space, the likelihood-ratio receiver for optimal detection of a doubly-spread scatterer in the presence of nonstationary, anisotropic Gaussian interference is derived as a functional on the particular space. It is shown that the white noise assumption is not a mathematical necessity for the detection problem to be nonsingular. However, by a slight extension of the theory, such an assumption can be easily included if it is convenient. The operator equations which define the individual elements in the optimal receiver structure are shown to be related to some common forms of signal processors. More specifically, using the concept of unitary equivalence of Hilbert spaces, the problems of frequency domain processing, beamsteering and space-time factorability, and processing of bandlimited signals are easily connected with the abstract theory. The link between the optimal detector and adaptive realizations is provided by an interpretation of the defining operator equations in the Hilbert space of random variables. Stochastic convergence of adaptive algorithms, in the mean-square sense, is based on a stochastic version of a fixed-point theorem. GRA

N84-11877 California Univ., Berkeley.
SOME RESULTS ON STABLE RANK 2 VECTOR BUNDLES AND REFLEXIVE SHEAVES ON CUBIC RHO Ph.D. Thesis
Mei-Chu Chang 1982 89 p
Avail: Univ. Microfilms Order No. DA8312778

The moduli spaces of stable rank two reflexive sheaves on cubic Rho with small Chern classes were investigated. In most cases the moduli space is irreducible, nonsingular and rational. As one application, the irreducibility and unirationality of the moduli space of stable rank 2 vector bundles on Rho cubic with Chern classes C (sub 1) = 0 and C (sub z) = 4 having Atiyah-Rees a-invariant a = 1. Another application is to curves of low degree in cubic Rho. In certain cases we are able to prove the curve has maximal rank and that the corresponding Hilbert scheme is irreducible and unirational. Dissert. Abstr.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N84-11878 Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
ENERGY CONSERVING NONRELATIVISTIC GUIDING CENTER MECHANICS AND THE GALILEAN PRINCIPLE OF RELATIVITY
H. K. Wimmel Mar. 1983 27 p refs Sponsored by Euratom
(IPP-6/219) Copyright. Avail: Issuing Activity

Arguments and representative examples that suggest that exact energy conservation and Galilei invariance are incompatible in nonrelativistic guiding center mechanics are given. Provided that this is true in general it also follows that exact energy conservation and Lorentz invariance are incompatible in relativistic guiding center mechanics. It follows that every guiding center

mechanics with exact energy conservation is a nonunique theory owing to the principle of relativity. A Galilei invariant guiding center mechanics that does not conserve energy is presented.
Author (ESA)

N84-11879# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FORMING OF MAGNETIC FIELDS WITH COMPLEX LAW OF VARIATION IN TIME
V. V. Ivashin and E. G. Furman 1 Jul. 1983 15 p refs Transl. into ENGLISH from Tr. Nauch.-Issled. Inst. Yadernoy Fiz. Elektron. i Avotmatiki (USSR), no. 2, 1972 p 46-52
(AD-A131128; FTD-ID(RS)T-0461-83) Avail: NTIS HC A02/MF A01 CSCL 20/3

The examined shaping systems use the most efficient working modes: capacitors (unipolar with respect to voltage), and electromagnets (unipolar with respect to current). This makes possible the substantially increased technical and economic indicators of these systems. Programmed control of the shape of the magnetic cycle of the electromagnet in time is achieved. Author

N84-11880# Texas Univ., Austin. Inst. for Fusion Studies.
CONSTRUCTION OF THREE-DIMENSIONAL VACUUM MAGNETIC FIELDS WITH DENSE NESTED FLUX SURFACES
John R. Cary May 1983 47 p refs
(Contract DE-FG05-80ET-53088)
(DE83-012600; DOE/ET-53088/95) Avail: NTIS HC A03/MF A01

Toroidal vacuum magnetic fields are analyzed by the surface of section technique and noncanonical perturbation theory. The surface of section analysis shows that it is easy to find magnetic fields with an outermost flux surface of relatively small aspect ratio. However, as the aspect ratio is decreased, so is the rotational transform of the outermost flux surface. A new method of averaging combined with noncanonical perturbation theory shows that island overlap can account roughly for this loss of rotational transforms. Finally, it is shown that one can significantly decrease the stochasticity and island structure by making small modifications to the magnetic field. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N84-11881 Purdue Univ., Lafayette, Ind.
TRANSMISSION OF SOUND THROUGH A CYLINDRICAL SHELL AND A LIGHT AIRCRAFT FUSELAGE Ph.D. Thesis
Yiren Simon Wang 1982 152 p
Avail: Univ. Micrfilms Order No. DA8310873

A light aircraft fuselage was modeled as a half scale cylindrical shell to study the sound transmission through the structure. An analytical model based on Statistical Analysis (SEA) was developed for predicting the sound transmission loss of the cylindrical shell in the frequency range above 500 Hz. The parameters involved in the SEA model such as modal densities and radiation efficiencies were obtained from the wavenumber diagram using a numerical technique. In the low frequency range, a band limited power flow model was used to predict the noise reduction of the cylinder. In this low frequency model, the resonant transmission was calculated for each cavity mode and the nonresonant transmission was computed by using the mass law.
Dissert. Abstr.

N84-11882*# New South Wales Univ., Kensington (Australia). School of Mechanical and Industrial Engineering.
EXPERIMENTAL DETERMINATION OF THE PARTICLE MOTIONS ASSOCIATED WITH THE LOW ORDER ACOUSTIC MODES IN ENCLOSURES
Kerry P. Byrne and Steven E. Marshall Jul. 1983 37 p refs
(Contract NAG1-58)
(NASA-CR-174542; NAS 1.26;174542; HL-83-22; Rept-5) Avail: NTIS HC A03/MF A01 CSCL 20A

A procedure for experimentally determining, in terms of the particle motions, the shapes of the low order acoustic modes in enclosures is described. The procedure is based on finding differentiable functions which approximate the shape functions of the low order acoustic modes when these modes are defined in terms of the acoustic pressure. The differentiable approximating functions are formed from polynomials which are fitted by a least squares procedure to experimentally determined values which define the shapes of the low order acoustic modes in terms of the acoustic pressure. These experimentally determined values are found by a conventional technique in which the transfer functions, which relate the acoustic pressures at an array of points in the enclosure to the volume velocity of a fixed point source, are measured. The gradient of the function which approximates the shape of a particular mode in terms of the acoustic pressure is evaluated to give the mode shape in terms of the particle motion. The procedure was tested by using it to experimentally determine the shapes of the low order acoustic modes in a small rectangular enclosure. M.G.

N84-11883*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CORRELATION OF FLIGHT EFFECTS ON CENTERLINE VELOCITY DECAY FOR COLD-FLOW ACOUSTICALLY EXCITED JETS
Uwe H. vonGlahn [1982] 17 p refs Presented at the 106th Meeting of the Acoustical Soc. of Am., San Diego, Calif., 7-11 Nov. 1983
(NASA-TM-83502; E-1842; NAS 1.15:83502) Avail: NTIS HC A02/MF A01 CSCL 20A

Acoustic excitation can influence the large scale shear layer structure of jet flow, thereby causing the jet centerline velocity to decay more rapidly. this phenomena has numerous practical applications, such as the reduction of jet/flap impingement velocity in order to reduce flap structural loads for under-the-wing STOL aircraft concepts. Cold flow centerline velocity decay data obtained with acoustic excitation of the jet exhaust flow are correlated with and without flight effects. Initially, static data are correlated in terms of an acoustic parameter involving the threshold sound level needed to initiate acoustic excitation of the jet plume. It is shown that for a given flight speed, the same acoustic excitation parameter as that developed for the static condition is valid. Finally, an aerodynamic flight effects parameter is included to correlate the static and flight centerline velocity decay data with and without acoustic excitation. S.L.

N84-11884*# Modern Analysis, Inc., Ridgewood, N. J.
STUDY OF NOISE TRANSMISSION THROUGH DOUBLE WALL AIRCRAFT WINDOWS
R. Vaicaitis Jun. 1983 93 p refs
(Contract NAS1-16117)
(NASA-CR-172182; NAS 1.26:172182; Rept-3) Avail: NTIS HC A05/MF A01 CSCL 20A

Analytical and experimental procedures were used to predict the noise transmitted through double wall windows into the cabin of a twin-engine G/A aircraft. The analytical model was applied to optimize cabin noise through parametric variation of the structural and acoustic parameters. The parametric study includes mass addition, increase in plexiglass thickness, decrease in window size, increase in window cavity depth, depressurization of the space between the two window plates, replacement of the air cavity with a transparent viscoelastic material, change in stiffness of the plexiglass material, and different absorptive materials for the interior walls of the cabin. It was found that increasing the exterior plexiglass thickness and/or decreasing the total window size could achieve the proper amount of noise reduction for this aircraft. The total added weight to the aircraft is then about 25 lbs. Author

N84-11885*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CROSS SPECTRA BETWEEN PRESSURE AND TEMPERATURE IN A CONSTANT-AREA DUCT DOWNSTREAM OF A HYDRO-

GEN-FUELED COMBUSTOR
J. H. Miles, C. A. Wasserbauer, and E. A. Krejsa Nov. 1983 30 p refs Presented at the 150th Meeting of the Acoustical Soc. of Am., Cincinnati, 10-13 May 1983
(NASA-TM-83463; E-1779; NAS 1.15:83463) Avail: NTIS HC A03/MF A01 CSCL 20A

Pressure temperature cross spectra are necessary in predicting noise propagation in regions of velocity gradients downstream of combustors if the effect of convective entropy disturbances is included. Pressure temperature cross spectra and coherences were measured at spatially separated points in a combustion rig fueled with hydrogen. Temperature-temperature and pressure-pressure cross spectra and coherences between the spatially separated points as well as temperature and pressure autospectra were measured. These test results were compared with previous results obtained in the same combustion rig using Jet A fuel in order to investigate their dependence on the type of combustion process. The phase relationships are not consistent with a simple source model that assumes that pressure and temperature are in phase at a point in the combustor and at all other points downstream are related to one another by only a time delay due to convection of temperature disturbances. Thus these test results indicate that a more complex model of the source is required. Author

N84-11886# RF Monolithics, Inc., Dallas, Tex.
ETCHED CAVITY SAW (SURFACE ACOUSTIC WAVE) RESONATOR ELEMENTS FOR MULTIPOLE FILTER APPLICATIONS Final Technical Report, 1 Jul. 1981 - 28 Feb. 1983
R. J. Kansy Jun. 1983 81 p refs
(Contract N00014-81-C-2304)
(AD-A131002) Avail: NTIS HC A05/MF A01 CSCL 20/1

The objective of this program is the evaluation of a unique Surface Acoustic Wave (SAW) resonator element proposed by RF Monolithics for applications in multipole bandpass filters. The economical realization of multipole SAW resonator filters having steep skirts, low loss, and high out-of-band rejection requires the availability of SAW resonator elements having specific attributes: (1) reproducibility, (2) high coupling, (3) single moded, and (4) high Q. The resonator element studied during this program was invented to satisfy these requirements. The key features of this new device are: (1) a uniform SAW velocity throughout the structure that reduces sensitivity to variations in the fabrication process, (2) independent realization of transduction and reflection functions that allow high coupling and good longitudinal mode suppression, and (3) a self-aligned multilevel process that eliminates critical alignments and promises high producibility in a volume manufacturing environment. GRA

N84-11887# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
HELICOPTER NOISE SURVEY PERFORMED AT PARKER CENTER, PASADENA, AND ANAHEIM, CALIFORNIA, ON FEBRUARY 10-14, 1983
Steven R. Albersheim Jun. 1983 34 p
(AD-A130962; FAA-EE-83-5) Avail: NTIS HC A03/MF A01 CSCL 20/1

The FAA conducted a noise measurement survey of helicopter operations at three different helipads in the Los Angeles metropolitan area during the period of February 10-14, 1983. The purpose was to gather needed information for defining noise problems with in-service helicopter operations in a suburban and urban area. Noise level data were sampled for a variety of helicopters for different operating conditions and land use characteristics. The data collected reflect noise levels at these sites from all local sources of noise during that particular sampling period. These data from helicopter targets of opportunity are termed survey data as opposed to controlled test data in order to reflect the limited control over factors which contribute to the variability of the measured noise level. Author (GRA)

N84-11888# Utah Univ., Salt Lake City. Dept. of Mathematics.
RATIONAL FUNCTION FREQUENCY EXTRAPOLATION IN ULTRASONIC TOMOGRAPHY
Frank Stenger, M. J. Berggren, S. A. Johnson, and C. H. Wilcox Oct. 1982 29 p refs
(Contract PHS-CA-29728; Grant DAAG29-77-G-0139)
(AD-A131447; ARO-19297.4-MA) Avail: NTIS HC A03/MF A01 CSCL 20/1

This paper describes a procedure for solving the inverse scattering problem in ultrasonic imaging. The derivation of the method is based on the Helmholtz differential equation model. GRA

N84-11889# Kloeckner-Werke A.G., Troisdorf (West Germany). Mannstaedt-Werke.
A LIGHT ASSEMBLY SYSTEM OF SECTIONS ADAPTABLE TO SOUND OR HEAT INSULATION, FOR NUMEROUS APPLICATIONS Final Report, Sep. 1981
Werner Hundt and Guenter Weber Bonn Bundesministerium fuer Forschung und Technologie May 1983 42 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-085; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,80

A wall unit system for sound or heat insulation is described. The unit comprises two identical L-shaped shells. Used as a sound protection barrier, the front wall comprises a perforated surface. The two shells are joined by means of a C-section. For use as a roadside sound protection barrier, U-shaped units are assembled at the construction site, and sound insulation mats are inserted. For heat insulation purposes heat insulation mats are used in place of the sound insulation mats. Two non-perforated sections are connected to the wall unit. For both purposes, the number of sound and heat conducting links required is reduced by half, owing to the U-shape of the unit. No welding, riveting or screwing is required. A sound absorption of 10 dB and a sound insulation of 31 dB were obtained. Heat insulation properties depend upon the insulation materials employed (mineral wool, etc). Author (ESA)

N84-11890 George Washington Univ., Washington, D.C.
AN ANALYSIS OF SHOCK COALESCENCE INCLUDING THREE-DIMENSIONAL EFFECTS WITH APPLICATION TO SONIC BOOM PREDICTION Ph.D. Thesis
Christine Mann Darden 1983 169 p
Avail: Univ. Microfilms Order No. DA8310879

A method for analyzing shock coalescence which includes three dimensional effects is developed. Based on an extension of the axisymmetric solution, the asymmetric effects are introduced through an additional of governing equations which are derived by taking the second circumferential derivative of the standard shock equations in the plane of symmetry. The coalescence method is consistent with and was combined with a nonlinear sonic boom extrapolation program which is based on a modified method of characteristics. Though the two sets of governing shock equations are uncoupled, the flow equations, developed in the same manner, are weakly coupled through the first derivative of the cross flow term w, and since the characteristic behind the shock is necessary to fix shock location, an interactive procedure between the axisymmetric and asymmetric equations is used. The extrapolation program, originally unable to handle shock coalescence, is now able to extrapolate pressure signatures. Dissert. Abstr.

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N84-11891# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EFFICIENCY OF WOOD AS A PASSIVE SHIELDING FOR PARTICLES AND PHOTONS OF 0.5 TO 4.6 MeV BETWEEN 940 AND 377 mb [EFICIENCIA DA MADEIRA COMO BLINDAGEM PASSIVA PARA PARTICULAS E FOTONS DE 0,5 A

4,6 MEV ENTRE 940 E 377 MB]
Odylio D. Aguiar and Daniel J. R. Nordemann Sep. 1983 34 p refs In PORTUGUESE; ENGLISH summary
(INPE-2864-PRE/399) Avail: NTIS HC A03/MF A01

A pair of scintillators NaI(Tl), 4 x 4 inches, one completely shielded with 20g/square cm of high density wood (1.3g/square cm) and the other unshielded, was flown aboard a Bandeirante aircraft over the region of Sao Jose dos Campos, up to altitudes of 25000 feet (377mb). The spectra of the detectors with and without the wood shield are similar, and the spectral indices indicate that they are a function of atmospheric depth in the range 0.6 to 2.4 MeV. Between 2.4 and 4.6 MeV the shielded detector presented a counting rate which is 20% lower than the counting rate obtained by the unshielded detector. In this same energy range the counting rate of the shielded detector is equal to the counting rate of the unshielded detector located at an atmospherical depth of 35g/square cm higher. The attenuation length showed a decrease with the energy in the 0.65 to 4.6 MeV range an increase above this energy. This increase is, probably, due to the strong influence of muons and electrons in this range. Author

N84-11892# Naval Research Lab., Washington, D. C.
NUMERICAL SIMULATION OF HIGH ENERGY LIGHT ION BEAM FLOW THROUGH A FOILLESS DIODE
Robert J. Barker, Charles W. Roberson, and Frederick Mako 21 Jul. 1983 23 p refs
(RR0110941)
(AD-A131001; NRL-MR-5058) Avail: NTIS HC A02/MF A01 CSCL 12/1

A numerical and theoretical study is reported which treats the effects upon a 500 ke V, hollow electron beam in a foilless diode along the centerline of which has been injected a beam of 30 Me V protons. Specifically, the results of simulations of three, separate equilibrium diode states (for electron-only, 1 kA of protons, and 5 kA of protons) are reported. The computational findings are compared to rough, theoretical predictions and very good agreements is observed. The conclusion may be drawn that, for the diode parameters studied, a 1 kA beam of 30 Me V protons does not seriously disrupt the electron beam. On the other hand, a 5 kA proton beam not only radically alters the REB (Relativistic Electron Beam) characteristics but also itself falls prey to strong, radial ballooning. Author (GRA)

N84-11893# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATING THE PROBABILITY OF RADIATION FROM THE DISSOCIATED STATES OF DIATOMIC MOLECULES
V. A. Kochelap 6 Jul. 1983 18 p refs Transl. into ENGLISH from Ukr. Fiz. Zh. (USSR), v. 15, no. 6, Jun. 1980 p 1000-1013
(AD-A131069; FTD-ID(RS)T-0571-83) Avail: NTIS HC A02/MF A01 CSCL 07/4

The probability of electronic phototransition accompanying the collision of two atoms was calculated. The main problem is a correct consideration of the relative motion of atoms, which constitutes the specific nature of the phototransition under consideration. The electron motion is assumed to be given (in an adiabatic approximation). The relative motion of electrons is being examined with the aid of the Shroedinger equation. The results obtained are more general than those of the classical theory. The spectral dependence of the probability of radiation during a collision of two atoms was investigated. Author

N84-11894# Avco-Everett Research Lab., Mass.
EXPERIMENTAL STUDY OF DISSOCIATIVE ATTACHMENT IN OPTICALLY-PUMPED LITHIUM MOLECULES Final Report, 1 May 1982 - 30 Apr. 1983
Malcolm W. McGeoch and Robert E. Schlier May 1983 72 p refs
(Contract F49620-82-C-00512AF Proj. 2301)
(AD-A131601; AFOSR-83-0725TR) Avail: NTIS HC A04/MF A01 CSCL 20/8

Details are presented of an experimental study which has as its goal the observation of lithium negative ions by the process of dissociative attachment in optically-pumped lithium dimer molecules. A description is given of a new lithium supersonic beam apparatus with a slit nozzle and gravitational recirculation of the molten lithium. The source operates up to 900 C and yields a lithium density of 3/1 x 10 to the 14th power cm at 10 cm downstream from the slit. The beam density is modelled as a function of spatial coordinates. Two- and three-step photoionization of lithium dimers and lithium atoms has been performed using multiple, tunable nitrogen-pumped dye lasers. An electron density of up to 3/10 to the 10th power cm has been created in the beam. GRA

N84-11895# Sandia Labs., Albuquerque, N. Mex.
PROCEEDINGS OF THE WORKSHOP ON ION MIXING AND SURFACE LAYER ALLOYING Final Report, 14-16 Apr. 1983
S. T. Picraux and M.-A. Nicolet (California Inst. of Technology, Pasadena) 6 May 1983 179 p refs Workshop held in Pasadena, Calif., 15-16 Apr. 1983
(Contract DE-AC04-76DP-00789; Grant N00014-83-G-0057)
(AD-A131469) Avail: NTIS HC A09/MF A01 CSCL 20/8

The purpose of this workshop was to bring together in an informal setting individuals actively involved in ion mixing, and individuals working on high dose ion implantation and its application to the improvement of surface properties of solids. The objectives of the workshop included: Outline present understanding of the basic physical processes uderlying ion mixing; Compare the approach of ion mixing to that of high dose ion implantation; Assess the areas of greatest potential practical applications for ion mixing; and Identify critical areas on which future investigations should focus. Author (GRA)

N84-11896# Brookhaven National Lab., Upton, N. Y. Physics Dept.
FRAGMENTATION OF SMALL MOLECULES FOLLOWING SOFT X-RAY EXCITATION
W. Eberhardt (Exxon Corp., Linden, N.J.), T. K. Sham, R. Carr, S. Krumacher (State Univ. of New York, Stony Brook), M. Strongin, S. L. Weng, and D. Wesner 1983 2 p ref Presented at the 7th Intern. Conf. on Vacuum Ultraviolet Radiation Phys., Jerusalem, 8 Aug. 1983
(Contract DE-AC02-76CH-00016)
(DE83-011645; BNL-32994; CONF-830821-1) Avail: NTIS HC A02/MF A01

Soft X ray excitation involving C 1s electrons in CO and acetone, (CH3)2CO, is found to result in ionic fragmentation of the original molecule. The fragmentation pattern changes whether the C 1s electron gets ionized, excited into a Rydberg-line orbital or into an antibonding (IC OMEGA)* molecular orbital. Also the fragmentation occurs specifically around the site of the carbon atom where the optical excitation takes place. Based on these observations one might consider the use of tunable soft X rays to stimulate chemical reactions. DOE

N84-11897# Los Alamos Scientific Lab., N. Mex.
CHAOS IN SEMICLASSICAL MODEL OF MULTIPHOTON EXCITATION OF SPHERICAL TOP MOLECULES
H. W. Galbraith, J. B. Ackerhalt, and P. W. Milonni 1983 9 p refs Presented at 5th Rochester Conf. on Coherence and Quantum Opt., Rochester, N.Y., 13 Jun. 1983
(Contract W-7405-eng-36)
(DE83-014201; LA-UR-83-1574; CONF-830616-2) Avail: NTIS HC A02/MF A01

The dynamical effects of vibration-rotation coupling in multiple photon excitation at lowest order using the simplest molecular model possible: that of an oscillator (triply degenerate) and uncoupled rigid rotor. The molecule-field interactions introduce a vibration-rotation nonlinearity which gives rise to nonconservation of the molecular angular momentum and in some instances consequent chaotic dynamics. The chaos leads to incoherence (widely seen in experiments) in the time dependence of the photon absorption and is not treatable in an additive way as inhomogeneous broadening. The nonconservation of the molecular angular momentum is due to the development with time of the

molecular vibrational angular momentum. The degree of chaotic behavior is found to depend upon the relative size of the vibrational to pure rotational angular momenta as the excitation progresses, i.e., when vibrational angular momentum exceeds the pure rotational angular momentum we find chaos, conversely when J0 is quite large the motion is gyroscopically stabilized and quasiperiodic. Therefore, the suggested cold experiments are perhaps not so desirable. DOE

N84-11898# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-CURRENT RAILGAP STUDIES
R. Druce, L. Gordon, W. Hofer, and M. Wilson 3 Jun. 1983 5 p refs Presented at IEEE Power Electron. Specialists Conf., Albuquerque, N. Mex., 6 Jun. 1983
(Contract W-7405-eng-48)
(DE83-013859; UCRL-88624; CONF-830621-25) Avail: NTIS HC A02/MF A01

Characteristics of a 40-kV, 750-kA, multichannel rail gap are presented. The gap is a three electrode, field distortion triggered design, with a total switch inductance of less than 10 nH. At maximum ratings, the gap typically switches 10 C per shot, at 700 kA, with a jitter of less than 2 ns. Channel evolution and current division were studied on image converter streak photographs. Transient gas pressure measurements were made to investigate the arc generated shocks and to detect single channel failure. Channel current sharing and simultaneity are described and their effects on the switch inductance in the channel current sharing and erosion measurements are discussed. DOE

N84-11899# California Univ., Irvine. Dept. of Physics.
COLLECTIVE-FOCUSING ION ACCELERATOR Final Technical Report, 1 Apr. 1978 - 31 Mar. 1981
Norman Rostoker and Amnon Fisher Mar. 1982 11 p refs
(Contract DE-AT03-76ER-70286)
(DE83-012795; DOE/ER-70286-T1) Avail: NTIS HC A02/MF A01

In the Collective-Focusing Ion Accelerator (CFIA), electrons are confined by an external magnetic field. The electrostatic field of the electrons serves to cnfine or focus ions and the acceleration is conventional. In toroidal geometry the acceleration is like a Betatron. The focusing principle was first enunciated by Gabor who sowed that the focal length of a lens for ion beams is reduced by about three orders of magnitude if the magnetic field confines electrons which focus ion beam, compared to using the magnetic field directly. A compact toroidal accelerator based on this principle was described conceptually. In 1978 an experimental research program was started at the University of California, Irvine (UCI) to apply the focusing principle to a small accelerator system. The objective was to establish the feasibility of a compact high current ion accelerator. DOE

N84-11900# Sandia Labs., Albuquerque, N. Mex. Pulsed Power Operations Div.
OPERATIONAL FACTORS IN THE DESIGN OF THE PBFA 2 ACCELERATOR
Steven A. Goldstein 1983 4 p refs Presented at the IEEE Power Electron. Spec. Conf., Albuquerque, N. Mex., 6 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013076; SAND-83-0125C; CONF-830621-13) Avail: NTIS HC A02/MF A01

The design of the multi-module, multi-terrawatt, multi-megajoule PBFA II accelerator mandates special consideration of factors aiding in the effective assembly, optimization, and long term operation of the facility. The operational efficiency of PBF II is anticipated to be improved by addressing: the necessary steps in the evolution of a super power generator, a phased implementation philosophy for engineering the facility, the advantages of 3-dimensional design modeling, and advantages of automation technology in control/monitor, data acquisition, and component inventory areas. Author

N84-11901# Sandia Labs., Albuquerque, N. Mex.
THE COMET: A 6-MV, 400-kJ, MAGNETICALLY-SWITCHED PULSE-POWER MODULE
E. L. Neau 1983 10 p refs Presented at IEEE Power Electron. Specialists Conf., Albuquerque, N. Mex., 6 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-013077; SAND-83-0212C; CONF-830621-14) Avail: NTIS HC A02/MF A01

The Inertial Confinement Fusion program at Sandia National Laboratories (SNL) is based on the use of large, economical, multi-module, multimegavolt accelerators to drive ion beam generating diodes or imploding plasma loads. This type of accelerator uses several stages of pulse time compression to raise the peak power to the multi-terrawatt level. Pulsed power accelerators have traditionally relied on the ionization of a gaseous, liquid, or solid material, through one or several channels, to connect one pulse compression stage to a succeeding stage. The large change in inductance of a region enclosing a saturable ferri or ferromagnetic material can, with proper design, be substituted for the more conventional switching techniques in certain applications. The use of amorphous METGLAS 2606SC saturable cores, based on earlier system studies, as a possible low-loss repetitive substitute for the self-closing water switches used in the final stages of one class of the pulse power accelerators was investigated. DOE

N84-11902# Stanford Linear Accelerator Center, Calif.
LATEST ON POLARIZATION IN ELECTRON STORAGE RINGS
A. W. Chao 1983 7 p refs Presented at Particle Accelerator Conf., Santa Fe, N. Mex., 21 Mar. 1983
(Contract DE-AC03-76SF-00515)
(DE83-012764; SU-SLAC-Pub-3081; CONF-830311-152) Avail: NTIS HC A02/MF A01

The field of beam polarization in electron storage rings is making rapid progress in recent several years. Some of these developments concerning how to produce and maintain a high level of beam polarization are summarized. Emphasized will be the ideas and current thoughts people have on what should and could be done on electron rings being designed at present such as HERA, LEP and TRISTAN. DOE

N84-11903# Stanford Linear Accelerator Center, Calif.
STATUS OF THE SLAC SNOOP DIAGNOSTIC MODULE FOR FASTBUS
H. V. Walz and D. B. Gustavson Mar. 1983 4 p refs Presented at Particle Accelerator Conf. Santa Fe, N. Mex., 21 Mar. 1983
(Contract DE-AC03-76SF-00515)
(DE83-012715; SU-SLAC-Pub-3068; CONF-830311-145) Avail: NTIS HC A02/MF A01

A SNOOP Diagnostic Module for FASTBUS is under development at SLAC. The SNOOP Module resides on a FASTBUS crate seqment and provides diagnostic monitoring and testing capability. It consists of a high-speed ECL front-end to monitor and single-step segment operations, a simple master interface, and a control processor with two serial communication ports. Module features and specifications are summarized, and prototype hardware is shown. DOE

N84-11904# Stanford Linear Accelerator Center, Calif.
EMITTANCE CALCULATIONS FOR THE STANFORD LINEAR COLLIDER INJECTOR
J. C. Sheppard, J. E. Clendenin, R. H. Helm, M. J. Lee, R. H. Miller, and C. A. Blocker (Harvard Univ.) 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21 Mar. 1983
(Contract DE-AC03-76SF-00515)
(DE83-011851; SU-SLAC-PUB-3080; CONF-830311-159) Avail: NTIS HC A02/MF A01

A series of measurements were performed to determine the emittance of the high intensity, single bunch beam that is to be injected into the Stanford Linear Collider. On-line computer programs were used to control the Linac for the purpose of data acquisition and to fit the data to a model in order to deduce the

beam emittance. The method of emittance calculation is described and some of the measurement results are presented. DOE

N84-11905# Argonne National Lab., Ill.
MOLECULAR PHOTOIONIZATION STUDIES
P. M. Dehmer 1983 6 p refs Presented at the DOE/OHER Program Rev. Meeting on Phys. and Chem. of Atmospheric Pollution, Gettysburg, Pa., 26 Apr. 1983
(Contract W-31-109-eng-38)
(DE83-014283; CONF-830494-1) Avail: NTIS HC A02/MF A01

The electronic structure of small moles and clusters of molecules was studied. Of particular interest is the interaction of discrete electronic states with one another and with the various ionization and dissociation continua. Significant progress was made in the following areas: electronic structure of dimers and small clusters of rare gas atoms using photoionization techniques; clusters of CO2 molecules; electronic structure of rare gas dimers and trimers using photoelectron and photoelectron-photoion coincidence techniques; the relationship between Rydberg states in atoms, van der Waals molecules, and chemically-bonded molecules; photoabsorption, photoionization, and predissociation processes in H2 to the unsymmetric isotope HD; photoelectron spectra of H2 and C2H2; dissociation processes in small molecules; and the spectra and dynamics of the photoionization processes in small molecules using the technique of multiphoton ionization followed by mass and electron energy analysis of the product ions and electrons is to be studied. DOE

N84-11906# Sandia Labs., Albuquerque, N. Mex.
TRANSIENT ELECTRON TRANSPORT IN GASES
L. C. Pitchford and T. A. Green 1983 11 p refs Presented at the DOE/FRG Joint Workshop on Diffuse Discharge, Bad Honneff, West Germany, 15 Aug. 1983
(Contract DE-AC04-76DP-00789)
(DE83-009188; SAND-83-0151C; CONF-830810-1) Avail: NTIS HC A02/MF A01

The time-dependent Boltzmann equation was solved in a spatially homogeneous or spatially averaged approximation for four model cases. From these model results, qualitative conclusions as to how the electron energy distribution function (EEDF) and thus the electron behavior readjusts to changes in time in the applied electric field may be drawn. The model cases selected were for cases where partial analytical results are available or were derived for this work. Comparison of the numerical results with the analytical solutions provided rigorous tests of the numerical methods used in the computer solution of the time-dependent Boltzmann equation. The method used for the solution of the Boltzmann equation is an extension of a previously developed technique in which the angular dependence of velocity is approximated as an n-term Legendre series and the energy or velocity dependence is repesented by B-splines. The differential equations for each of the coefficients of the Legendre series are integrated using a variable order Adams-Bashforth-Moulton predictor-corrector algorithm. DOE

N84-11907# Argonne National Lab., Ill.
RELATIVISTIC EFFECTS IN THE BINDING ENERGIES OF FEW-BODY NUCLEI
F. Coestler and R. B. Wiringa 1983 2 p refs Presented at 10th Intern. Conf. on Few-Body Probl. in Phys., Karlsruhe, West Germany, 21 Aug. 1983
(Contract W-31-109-eng-38)
(DE83-014711; CONF-830862-1) Avail: NTIS HC A02/MF A01

The consequences of Poincare invariance for the binding energy calculations of few-body nuclei was examined. Nonrelativistic Hamiltonians were considered in an attempt to fit simultaneously the binding energies of 2-, 3-, 4-body nuclei and that of nuclear matter. Even with reasonable three-body forces it appears to be difficult to simultaneously fit the binding energies of 3- and 4-body nuclei. The size of the discrepancy is of the order of possible relativistic effects. After elimination of the center of mass motion the two body Schroedinger equation can always be interpreted as a relativistic equation. Given a two-body mass operator (i.e., a two-body Hamiltonian for zero total momentum) it is possible to construct a consistent relativistic multi-body dynamics with a nonrelativistic limit. The relativistic effects can be calculated in first-order perturbation theory using an expansion in inverse powers of the nucleon mass. DOE

N84-11908# Stanford Linear Accelerator Center, Calif.
BLOWUP OF A WEAK BEAM DUE TO INTERACTION WITH A STRONG BEAM IN AN ELECTRON STORAGE RING
S. Kheifets Jul. 1983 4 p refs Presented at the 12th Intern. Conf. on High-Energy Accelerators, Batavia, Ill., 11-16 Aug. 1983
(Contract DE-AC03-76SF-00515)
(DE83-016089; SU-SLAC-PUB-3161; CONF-830822-1) Avail: NTIS HC A02/MF A01

The theoretical description of the beam-beam interaction presented here takes into account all the important features of the beam-beam phenomenon: the nonlinear beam-beam force and its dependence on both transverse coordinates, damping of the oscillations, presence of noise in the particle motion, in particular the quantum noise in its synchrotron radiation, actual machine functions, layout and the number E of interaction points, and to some extent inperfections present in the machine. The model deals not space distribution functions and the average (unperturbed and perturbed) characteristics of the bunch. DOE

N84-11909# Oregon Univ., Eugene. Inst. of Theoretical Sciences.
AMPLITUDE ANALYSIS OF ELASTIC P-P SCATTERING AT 6 GeV/c AT ALL T'S
Nader Ghahramany, Gary R. Goldstien (Tufts Univ., Medford, Mass.), and Michael J. Moravcskik Oct. 1982 19 p refs
(Contract DE-AT06-76ER-70004)
(DE83-015875; DOE/ER-70004/331) Avail: NTIS HC A02/MF A01

The extensive set of polarization data obtained at the ZGS for elastic proton-proton scattering at 6 GeV/c at a full set of values of t are used to determine the five complex reaction amplitudes, using the optimal formalism. The determination is easiest and in the transversity formalism, and from that the planar amplitudes (including the helicity amplitudes) are obtained. A complete determination is made at 20 different values of t, from t = -01 to t = 1.0,1 using data interpolated in t. In addition, a less complete set of data permits the determination of the five magnitudes (but not of the four phases) in the range from t = -1.0 to t = -2.0. The magnitudes of the five amplitudes can be obtained without any ambiguity, but for the four relative phases several distinct solutions exist, one of which is selected on the basis of continuity in t and minimum chi-square. There continues to be evidence that in the planar system in which the orientation axes are 90 deg from the helicity axes, all amplitudes tend to be either pure real or pure imaginary. Author

N84-11910# Ames Lab., Iowa.
HIGH-RESOLUTION NUCLEAR MAGNETIC RESONANCE IN SOLIDS (1975-1982)
B. C. Gerstein 1982 74 p refs
(Contract W-7405-eng-82)
(DE83-016408; IS-4813) Avail: NTIS HC A04/MF A01

Topics include shielding anisotropies, dipolar broadening (use and removal), rotations in real space and spin space for spin 1/2 nuclei, quadrupolar nuclei, and multiple quantum NMR. DOE

N84-11911# Texas Univ., Austin. Center for Particle Theory.
W DECAY IN SUPERGRAVITY GUTS
Duane A. Dicus, S. Nandi, and Xerxes Tata Apr. 1983 18 p refs
(Contract DE-AS05-76ER-03992)
(DE83-015144; DOE/ER-03992/517) Avail: NTIS HC A02/MF A01

The decay of the W-boson into supersymmetric particles and the decays of these particles in a unified theory in which gravity

breaks SU/sub L/(2) x U(1) was discussed. If the decay W (FEMALE) W tilde Z tilde is kinematically possible, the subsequent decay of the gauginos may provide a definitive signature for supersymmetry. DOE

N84-11912# Florida Univ., Gainesville. Particle Theory Group.
PHOTON-PHOTON PRODUCTION IN HADRON-HADRON COLLISIONS
R. D. Field 1983 45 p refs Presented at the 5th Intern. Workshop on Photon-photon Collisions, Aachen, 13-16 Apr. 1983
(Contract DE-AS05-81ER-40008)
(DE83-015948; DOE/ER-40008/41; CONF-8304110-1) Avail: NTIS HC A03/MF A01

Quantum Chromodynamic (QCD) estimates are made for the large transverse momentum production of single and double photons in pp, anti pp, and (LC OMEGA)(+)p collisions. In addition to the pure QED annihilation term q anti q (FEMALE) (BETA)(BETA), it is found that the QCD induced gluon-gluon subprocess qq (FEMALE (BETA)(BETA), is an important source of double photons. Photon Bremsstrahlung contributions are also examined. DOE

N84-11913# California Univ., Berkeley. Lawrence Berkeley Lab.
THE PHENOMENOLOGY OF DEEP-INELASTIC PROCESSES
L. G. Moretto 1983 21 p refs Presented at the Intern. Conf. on Heavy Ion Phys. and Nucl. Phys., Catania, Italy, 21-26 Mar. 1983 Prepared in cooperation with Max-Planck-Institut fuer Kernphysik
(Contract DE-AC03-76SF-00098)
(DE83-016622; LBL-16372; CONF-830340-3) Avail: NTIS HC A02/MF A01

The field of heavy ion deep inelastic reactions is reviewed with particular attention to the experimental picture. The most important degrees of freedom involved in the process are identified and illustrated with relevant experiments. Energy dissipation and mass transfer are discussed in terms of particles and/or phonons exchanged in the process. The equilibration of the fragment neutron-to-proton ratios is inspected for evidence of giant isovector resonances. The angular momentum effects are observed in the fragment angular distributions and the angular momentum transfer is inferred from the magnitude and alignment of the fragments spins. The possible sources of light particles accompanying the deep inelastic reactions are discussed. The use of the sequentially emitted particles as angular momentum probes is illustrated. The significance and uses of a thermalized component emitted by the dinucleus is reviewed. The possible presence of Fermi jets in the prompt component is shown to be critical to the justification of the one body theories. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N84-11914# Mission Research Corp., Albuquerque, N. Mex.
SINGLE EVENT UPSET PHENOMENA FROM HIGH ENERGY NEUTRONS Report, 1 Jan. - 1 Dec. 1981
R. L. Pease and J. P. Raymond 1 Dec. 1981 63 p refs
(Contract DNA001-80-C-0140; DNA Proj. X99-QAXV)
(AD-A131287; DNA-6195T; AMRC-R-312) Avail: NTIS HC A04/MF A01 CSCL 15/6

The susceptibility of circumvented and uncircumvented endoatmospheric and exoatmospheric systems to neutron induced SEU(Single Event Upsets) was considered in very general terms of nuclear weapon threat and system configuration. For both exoatmospheric and endoatmospheric uncircumvented systems it appears that transient upset effects will be dominated by effects of the prompt ionization pulse. In the worst case neutron-induced SEUs are comparable to the upset levels of the prompt ionization pulse. For current microelectronic components the neutron-induced SEUs do not need to be explicitly considered for uncircumvented systems. The relative susceptibilities should be reviewed with the evolution of microcircuit technology, particularly for possible preferential sensitivity to the localized ionization of a neutron-induced reaction compared to bulk ionization sensitivity. For circumvented systems there is clearly a potential consideration for exoatmospheric systems and a possible consideration for endoatmospheric systems. Given the threat, microcircuit susceptibility and system performance parameters, the calculation of potential concern for a circumvented exoatmospheric system is relatively straightforward. The high atmospheric concern is comparable to the exoatmospheric case. In some cases the relative neutron transport can be slightly enhanced over the prompt gamma pulse transport. The total prompt ionization pulse is also reduced by the increased attenuation of the low energy photons. GRA

N84-11915# Pacific Northwest Lab., Richland, Wash.
VITRIFICATION OF HIGHLY-LOADED SDS ZEOLITES
D. H. Siemens, G. H. Bryan, D. E. Knowlton, and C. A. Knox 1982 16 p refs Presented at the Am. Nucl. Soc. Winter Meeting, Washington, D.C., 14-19 Nov. 1982
(Contract DE-AC06-76RL-01830)
(DE83-006198; PNL-SA-10528; CONF-821103-92) Avail: NTIS HC A02/MF A01

Pacific Northwest Laboratory (PNL) is demonstrating a vitrification system designed for immobilization of highly loaded SDS zeolites. The Zeolite Vitrification Demonstration Project (ZVDP) utilizes an in-can melting process. All steps of the process were demonstrated, from receipt of the liners through characterization of the vitrified product. The system was tested with both nonradioactive and radioactive zeolite material. Additional high radioactivity demonstrations are scheduled to begin in FY 83. DOE

N84-11916# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
CHARACTERIZATION OF BOROSILICATE GLASS CONTAINING SAVANNAH RIVER PLANT RADIOACTIVE WASTE. 2: MICROSTRUCTURE AND DURABILITY
Ned E. Bibler 1983 12 p refs Presented at the 13th Intern. Congr. on Glass, Hamburg, 4-9 Jul. 1983 Submitted for publication
(Contract DE-AC09-76SR-00001)
(DE83-011246; DP-MS-82-111; CONF-830738-1) Avail: NTIS HC A02/MF A01

An important property of borosilicate glass that makes it suitable for immobilizing SRP nuclear waste is its low leachability (or high durability). Savannah River Laboratory (SRL) currently has a program investigating factors that may effect this leachablity using actual radioactive glass. Results of a quantitative investigation into one of these factors, devitrification, is reported reported. Two previous studies at SRL using earlier glass compostitions and simulated or actual waste showed that devitrification should not affect leachability. Verification of this conclusion for the present reference glass composition, with actual waste is conducted. Based on the results, the durability of SRP borosilicate glass is insensitive to devitrification. For example, 19 wt % crystallinity (acmite and ferrite spinels) caused by slow cooling or by exposure to an accidental fire affected the leachablity by 30% or less in short term leaching tests (up to 40 days). In longer tests simulating repository storage, saturation effects rather than devitrification will dominate leaching. DOE

N84-11917# Los Alamos Scientific Lab., N. Mex.
MULTI-ISOTOPIC GAMMA RAY ASSAY SYSTEM FOR ALPHA CONTAMINATED WASTE
D. A. Close, J. C. Pratt, J. T. Caldwell, W. E. Kunz, F. J. Schultz (ORNL), and K. W. Haff (ORNL) 1983 6 p refs Presented at the 24th Ann. Meeting of the Inst. of Nucl. Mater. Management, Vail, Colo., 10-13 Jul. 1983
(Contract W-7405-eng-36)
(DE83-015254; LA-UR-83-1931; CONF-830709-26) Avail: NTIS HC A02/MF A01

The capability of an existing segmented gamma ray system is being expanded for the analysis of alpha contaminated waste

drums. A cursory assay of 114 transuranic waste drums of 208-l capacity was made. Analysis of these data indictes a detection limit better than 100 nCi/g of waste for (237)Np/(233)Pa, (239)Pu, (241)Am, (243)Am/(239)Np. (6)OCo, (125)Sb, (134) (137)Cs, and (154)Eu. A pending Code of Federal Regulation (10CFR61) stipulates that the nuclear industry quantify not only its transuranic waste, but also certain beta and gamma ray emitting fission products. An assay system based on gamma ray spectroscopy is the only system that can meet this requirement for the fission products. DOE

N84-11918# Los Alamos Scientific Lab., N. Mex.
AUGER AND DEPTH PROFILE ANALYSIS OF SYNTHETIC CRYSTALS FOR DISPERSION OF SOFT X-RAYS
K. D. Rachocki, D. R. Brown, R. W. Springer, and P. N. Arendt 1983 25 p refs Presented at the Symp. on Appl. Surface Analysis, Dayton, Ohio, 9 Jun. 1983
(Contract W-7405-eng-36)
(DE83-015257; LA-UR-83-1965; CONF-830690-1) Avail: NTIS HC A02/MF A01

Numerous samples have been fabricated and analyzed as part of a program to produce soft X-ray dispersion elements for various laboratory applications. The majority of this work has centered around the carbon/tungsten system, although several other low-Z/high-Z pairs have been investigated. This report describes the development of certain vacuum-deposition techniques for fabricating these dispersion elements, based upon results obtained from X-ray reflectivity measurements and Auger depth-profile analysis. The composition of the films is chiefly alternating layers of tungsten carbide and carbon. Excess carbon is introduced during the deposition of the tungsten to ensure that the carbide layer is fully stoichiometric. Layer thickness ranged from approx. 5 to 30 A for the carbide and from approx. 15 to 80 A for the carbon. The reflectivity measurements were made using Fe and Al K/sub (-)/ at grazing incidence. The emphasis in these studies is on the application of surface-analysis results in suggesting modifications to the fabrication process and in evaluating the results such modifications have on the layer stoichiometry, continuity, and periodicity of the disperson elements so produced. Author

N84-11919# Sandia Labs., Albuquerque, N. Mex.
THICK DEPOSITS AND OVERLAYS FOR FUSION-REACTOR APPLICATIONS
D. M. Mattox 1983 22 p refs Presented at the 9th Intern. Vacuum Congr. and 5th Intern. Conf. on Solid Surfaces, Madrid, 26 Sep. - 1 Oct. 1983
(Contract DE-AC04-76DP-00789)
(DE83-014626; SAND-83-0812C; CONF-8309103-3) Avail: NTIS HC A02/MF A01

Coatings and/or claddings on the interior surfaces of magnetically confined fusion devices are necessary to control the plasma materials interactions which affect the reactor operation. Such interactions are: (1) machine conditioning, (2) impurity injection into the plasma, (3) fuel recycling from the plasma to the surfaces, and (4) material degradation. For present and near term engineering/experimental reactors relatively thin coatings of refractory coatings of low-Z materials on selected components were developed to reduce the erosion by chemical and physical sputtering and by arcing. These coatings have proven to be beneficial to the operation of experimental plasma devices and to be able to survive in the extreme environment of a high power plasma device. For future power reactors where erosion conditions will be more severe, thick coatings of low-Z materials are being developed. Of particular interest to depositing thick coatings over large areas and complex shapes is the low pressure plasma spray (LPPS) process which forms coatings and structures by deposition of high velocity molten particles. DOE

74 OPTICS

Includes light phenomena.

N84-11920* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REAL-TIME 3-D X-RAY AND GAMMA-RAY VIEWER Patent
Lo I. Yin, inventor (to NASA) Issued 13 Sep. 1983 8 p Filed 22 May 1981 Supersedes N82-10862 (20 - 01, p 0121)
(NASA-Case-GSC-12640-1; US-Patent-4,404,469;
US-Patent-Appl-SN-267178; US-Patent-Class-250-363R;
US-Patent-Class-250-363S; US-Patent-Class-250-368;
US-Patent-Class-378-2) Avail: US Patent and Trademark Office CSCL 20F

A multi-pinhole aperture lead screen forms an equal plurality of invisible mini-images having dissimilar perspectives of an X-ray and gamma-ray emitting object (ABC) onto a near-earth phosphor layer. This layer provides visible light mini-images directly into a visible light image intensifier. A viewing screen having an equal number of dissimilar perspective apertures distributed across its face in a geometric pattern identical to the lead screen, provides a viewer with a real, pseudoscopic image (A'B'C') of the object with full horizontal and vertical parallax. Alternatively, a third screen identical to viewing screen and spaced apart from a second visible light image intensifier, may be positioned between the first image intensifier and the viewing screen, thereby providing the viewer with a virtual, orthoscopic image (A'B'C') of the object (ABC) with full horizontal and vertical parallax.
Official Gazette of the U.S. Patent and Trademark Office

N84-11921* National Aeronautics and Space Administration. Pasadena Office, Calif.
OPTICAL FIBER TACTILE SENSOR Patent
Antal K. Bejczy, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 20 Sep. 1983 8 p Sponsored by NASA
(NASA-Case-NPO-15375-1; US-Patent-4,405,197;
US-Patent-Appl-SN-210405; US-Patent-Class-350-96.15;
US-Patent-Class-3-1.1; US-Patent-Class-73-432T;
US-Patent-Class-250-227; US-Patent-Class-350-96.10) Avail: US Patent and Trademark Office CSCL 20F

A tactile sensor comprises an array of cells which are covered by an elastic membrane, having an exposed surface which is adapted to come in contact with an object. Light is conducted to each cell from a light source by an optical fiber which terminates at the cell. Reflected light from the cell is conducted by an optical fiber to a light processor, which senses changes in the light received thereby from an ambient level whenever an object comes in contact with the membrane surface above the cell.
Official Gazette of the U.S. Patent and Trademark Office

N84-11922*# National Aeronautics and Space Administration, Washington, D. C.
GREAT PROSPECTS FOR FIBER OPTICS SENSORS
Thor-Erik Hansen Oct. 1983 11 p refs Transl. into ENGLISH from Elektro (Norway), v. 95, no. 2, 21 Jan. 1982 p 17-18, 23 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Central Inst. for Industrial Research
(Contract NASw-3541)
(NASA-TM-77357; NAS 1.15:77357) Avail: NTIS HC A02/MF A01 CSCL 20F

Fiber optic sensors provide noise immunity and galvanic insulation at the measurement point. Interest in such sensors is increasing for these reasons. In the United States sales are expected to increase from 12 million dollars in 1981 to 180 million in 1991. Interferometric sensors based on single modus fibers deliver extremely high sensitivity, while sensors based on multi-modus fibers are more easily manufactured. The fiber optic sensors which are available today are based on point measurements. Development of fiber optic sensors in Norway is being carried out at the Central institute and has resulted in the development of medical manometers which are now undergoing clinical testing.
Author

N84-11923# Rhode Island Univ., Kingston.
THE GORDON RESEARCH CONFERENCE ON HOLOGRAPHY AND OPTICAL INFORMATION PROCESSING Final Report, 19 Mar. - 26 Jun. 1982

Alexander M. Cruickshank Jul. 1982 22 p Conf. held in Kingston, R. I., 1982
(Contract AF-AFOSR-0257-82; AF Proj. 2305)
(AD-A129137; AFOSR-83-0223TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

The titles of the papers presented on holography and optical information processing are listed, covering the following areas: phase conjugation, integrated optics devices, diffraction patterns, spatial light modulation, image design, near infrared holograph, and optical transfer functions. B.G.

N84-11924# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OPTICAL CABLE-ELECTRICAL CABLE HYBRID TRANSMISSION SYSTEM. THE VIDEOPHONE: THE OPTICAL CABLE TRANSMISSION PART
Tang Ding-fan and Yu Qi-lu 18 Jul. 1983 17 p refs Transl. into ENGLISH from Dianzi Jishu Yingyong (China), no. 6, Jun. 1982 p 28-31 and 34
(AD-A131012; FTD-ID(RS)T-1499-82) Avail: NTIS HC A02/MF A01 CSCL 20/6

The development of the optical signal channel system is described briefly. After the frequency modulated voice signals (2.0 MHz) and the base band visual frequencies (1 MHz) were combined and amplified, direct intensity modulation was carried out with respect to a GaAlAS light emitting diode (LED). A step type optical cable was used to perform dual transmission. The receiver terminal used the low cost Si-PiN optoelectric diode for detection. The voices were clear and the pictures were sharp. Author

N84-11925# Naval Underwater Systems Center, New London, Conn. Surface Ship Sonar Dept.
FOSS (FIBER OPTIC SENSOR SYSTEM) FDM (FEASIBILITY DEMONSTRATION MODEL) ELECTROOPTICAL TOW CABLE TERMINATION
Todd E. Whitaker and William G. Mathews 11 Jul. 1983 19 p Presented at the Undersea Fiber Optic Cable Systems Workshop, Laurel, Md., 16 May 1983
(AD-A131319; NUSC-TD-6935) Avail: NTIS HC A02/MF A01 CSCL 17/1

This document contains the oral and visual presentation entitled FOSS FDM Electrooptical Tow Cable Termination, presented at the Undersea Fiber Optic Cable Systems (UFOCS) Workshop, Johns Hopkins University, Laurel, Maryland, 16 May 1983. A successful termination of the FOSS FDM Electrooptical Tow Cable has been demonstrated. This quadruple armored steel tow cable, whose core contains three wires and three multimode optical fibers, was mechanically, electrically, and optically terminated within a pressure-proof nose cone. Optical throughput losses of less than 2.0 dB per connection have been achieved using Hughes optical contacts. Tensile and pressure testing has verified the termination's performance. Author (GRA)

N84-11926# Advanced Information and Decision Systems, Mountain View, Calif.
THREE-DIMENSIONAL FEATURE EXTRACTION
Darwin Kuan Jun. 1983 5 p refs
(Contract F49620-82-C-0071; AF Proj. 2304)
(AD-A131333; AFOSR-83-0663TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

Range images offer significant advantages over passive reflectance images because they preserve the 3-D information of the scene viewed from the sensor, Therefore, range data is becoming an increasingly important source of information for a variety of applications including 3-D target classification, autonomous vehicles, and robot vision. This research is part of an effort to develop a 3-D object recognition system for vehicle objects in air-to-ground laser range imagery. The full system includes image feature extraction, object modeling, model-driven prediction, and feature to model matching. This paper presents several three-dimensional feature extraction techniques for use on laser range imagery. These include object-ground segmentation, projection image generation from range data, and 3-D physical edge detection. We emphasize extracting 3-D physical features of the object from 3-D range data without restricting ourselves in a sensor-centered range image format. The object-ground segmentation and projection image generation techniques extract global object features from range data, and are useful for object orientation estimation and major structures identification. The 3-D physical edge detector directly calculates the physical angle of the object surface. It is not only useful for physical edge (convex, concave, occluding) detection, but also provides useful information for extracting planar and curved surfaces. GRA

N84-11927# Naval Research Lab., Washington, D. C.
A BROADBAND HIGH POWER MILLIMETER TO CENTIMETER SPECTROMETER
F. Mako, J. A. Pasour, C. W. Roberson, and R. Lucey 8 Aug. 1983 23 p refs
(RR0110941)
(AD-A131629; NRL-MR-4945) Avail: NTIS HC A02/MF A01 CSCL 07/4

A simple spectrometer is described for measuring directly both a high electric field (0.1-100 kV/cm) and wavelength over a broadband (0.1-10 cm). The combination of interference and gas breakdown are utilized in measuring the electric field and wavelength. Electron diffusion and the characteristic breakdown relation limit resolution of submillimeter wavelengths by requiring very high electric fields (> 100 kV/cm). Author (GRA)

N84-11928# Rochester Univ., N. Y. Inst. of Optics.
OPTICAL SYSTEMS AND STATISTICAL OPTICS Annual Report, 1 Oct. 1981 - 1 Mar. 1983
Nicholas George May 1983 52 p
(Grant AF-AFOSR-3434-77; AF Proj. 2305)
(AD-A131297; AFOSR-83-0644TR) Avail: NTIS HC A04/MF A01 CSCL 20/6

Theoretical and experimental research is being conducted in the field of opto-electronic systems. The goal is to contribute solutions to problems of basic research importance which also have an underlying significance in practical applications that involve automatic pattern recognition and remote sensing. White light processing systems are described both for matched filtering and for diffraction pattern sampling. Also excellent progress is reported on our related studies of broadband holographic optical elements and an off-axis Fourier transform achromat. With coherent illumination we report a means for automatic image quality evaluation. The scattering of light by dielectric and conducting cylinders has been studied theoretically and experimentally with an emphasis on remote optical metrology. Author (GRA)

N84-11929# TRW, Inc., Philadelphia, Pa. Research and Development Labs.
FIBER OPTICS EXPANDED BEAM CONNECTOR Interim Technical Report, 1 Jan. - 30 Sep. 1982
James F. Ryley, Jr. Nov. 1982 48 p
(Contract DAAB07-82-C-J030)
(AD-A131125; CECOM-82-C-J030-1) Avail: NTIS HC A03/MF A01 CSCL 20/6

This interim technical report describes the first of two phases of development of a two channel, expanded beam, fiber optic connector. The connector has been designed with two Selfoc micro lenses per connector half providing the expanded beam nature. The preliminary development models resulting from this phase are explained in detail. The final models (phase II) will be based on these models with modifications mandated by test results and handling experience. Author (GRA)

N84-11930# California Univ., Los Angeles. Dept. of Physics.
CHARACTERIZATION OF INFRARED OPTICAL PROPERTIES OF TRANSPARENT MATERIALS Final Scientific Report, 1 Aug. 1978 - 31 Mar. 1983
Rubin Braunstein 15 Mar. 1983 28 p refs
(Grant AF-AFOSR-3665-78; AF Proj. 2306)
(AD-A131554; AFOSR-83-0629TR) Avail: NTIS HC A03/MF A01 CSCL 20/6

Chemical and structural imperfections which occur in highly transparent insulators and semiconductors were studied by a range of electromagnetic and electronic techniques. These utilized infrared wavelength modulation, high contrast Raman and Brillouin scattering and photoinduced transients spectroscopy techniques. The spectoral distribution of the absorption in the spectral region from 2.5-12 gamma was measured by infrared wavelength modulation techniques on: CaF2, LiF, NaCl, NaF, LaF3, BaF2, MgF2, SrF2, MgO, KCl, and KBr. Author (GRA)

N84-11931# California Inst. of Tech., Pasadena. Dept. of Fluid Mechanics and Thermodynamics.
CHEMICALLY REACTING TURBULENT SHEAR LAYERS Interim Report
M. M. Koochesfahani, P. E. Dimotakis, and J. E. Broadwell Jan. 1983 5 p refs Presented at the 21st AIAA Aerospace Sci. Meeting, Reno, Nev., 10-13 Jan. 1983 Previously announced as A83-16739
(Contract F49620-79-C-0159; AF Proj. 2308)
(AD-A131553; AFOSR-83-0650TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

An experimental investigation of entrainment, mixing and chemical reactions in a plane shear layer has been performed using laser induced fluorescence techniques. Results indicate that the reactants mix on a molecular level and react at a composition that is nearly uniform across the width of the layer. The composition of the mixed fluid is found to be asymmetric, with an excess of high speed fluid, suggesting that entrainment into the shear layer is asymmetric. These results are at variance with predictions of models based on gradient transport and eddy diffusivity. Author (GRA)

N84-11932# Los Alamos Scientific Lab., N. Mex.
RADIATION DAMAGE IN OPTICAL FIBERS
Peter B. Lyons, Larry D. Looney, and James W. Ogle 1983 7 p refs Presented at the Los Alamos Conf. on Optics, Santa Fe, N. Mex., 11-15 Apr. 1983
(Contract W-7405-eng-36)
(DE83-012740; LA-UR-83-1313; CONF-830425-18) Avail: NTIS HC A02/MF A01

While plastic-clad-silica (PCS) fiber shows the greatest radiation resistance, PCS fiber was difficult to reliably connectorize for routine field operations. For this reason, all-glass fibers were studied as an alternative to PCS. Based on available literature and some preliminary tests at Los Alamos, fluorosilicate clad, step index, pure silica core fibers were stressed. Recent laboratory data on these fibers relative to the PCS fibers were reviewed. Use of a fiber (or any optical medium) on a Cerenkov radiation to light transducer was discussed. Since the radiation induces attenuation in the medium, the light output is not proportional to the radiation input. The nonlinearity introduced by this attenuation is calculated. DOE

N84-11933# Los Alamos Scientific Lab., N. Mex.
SINGLE-MODE FIBER-OPTIC SENSOR FOR HIGH CURRENTS
Lynn R. Veeser, Robert S. Caird, Bruce L. Freeman, Don R. Kania, Peter J. Kruse, Robert J. Trainor, and Eugene L. Zimmerman 1983 4 p refs Presented at the 4th IEEE Pulsed Poser Conf., Albuquerque, N. Mex., 6 Jun. 1983
(Contract W-7405-eng-36)
(DE83-014163; LA-UR-83-1601; CONF-830621-32) Avail: NTIS HC A02/MF A01

A pulsed current sensor that will be less intrusive than present sensors and that will remain linear to much higher current levels was developed. Polarized laser light is transmitted by a low birefringence, single mode optical fiber that encircles the current carrier. The Faraday rotation of tne polarization plane in the current-induced magnetic field was observed. A Verdet constant of about 2600/MA for 633 nm light in Lightwave Technologies, Inc., Model F1506C fiber was measured, and currents of up to 12 MA in pulses 0.5 to 40 (SIGMA)s long were detected. Major problems involved signal noise from stray plasma light getting into the fiber and shock-induced birefringence that rotates the polarization slightly. Future plans are to try to Sagnac interferometer to reduce the sensitivity to shock waves. DOE

N84-11934# Sandia Labs., Albuquerque, N. Mex.
OPTICAL ANALYSIS OF A GIMBALLED MIRROR SYSTEM
G. S. Phipps Jul. 1983 38 p refs
(Contract DE-AC04-76DP-00789)
(DE83-0165765; SAND-83-1123) Avail: NTIS HC A02/MF A01

The pointing nonorthogonality and image rotation caused by reflection from a flat mirror that is gimballed in spherical coordinates is analyzed to permit more accurate error decoupling, photometric image derotation, and trajectory calculation for the Laser Tracker 2 system. DOE

N84-11935# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
THE RADIANCE FROM AN ISOTROPIC POINT SOURCE IN A MULTIPLE SCATTERING MEDIUM
Kjell Oestberg Jun. 1983 17 p refs
(FOA-C-30326-E2; ISSN-0347-3708) Avail: NTIS HC A02/MF A01; Research Inst. of National Defence, Stockholm KR 50

Starting from the general solution of the equation of radiative transfer in the small angle scattering approximation, expressions are derived for the radiance and irradiance from an isotropically radiating point source in a multiple scattering medium. These expressions are exact and comparatively simple to evaluate numerically. The corresponding results obtained with an approximate theory are discussed. The approximate theory is unsatisfactory at small angles and short distances. Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N84-11936*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DETERMINING THE ALPHA DYNAMO PARAMETER IN INCOMPRESSIBLE HOMOGENEOUS MAGNETOHYDRODYNAMIC TURBULENCE
W. H. Matthaeus, M. L. Goldstein, and S. R. Lantz (Maryland Univ., College Park) Oct. 1983 23 p refs Submitted for publication
(NASA-TM-85110; NAS 1.15:85110) Avail: NTIS HC A02/MF A01 CSCL 20I

Alpha, an important parameter in dynamo theory, is proportional to either the kinetic, current, magnetic, or velocity helicity of the fluctuating magnetic field and fluctuating velocity field. The particular helicity to which alpha is proportional depends on the assumptions used in deriving the first order smoothed equations that describe the alpha effect. In two cases, when alpha is proportional to either the magnetic helicity or velocity helicity, alpha is determined experimentally from two point measurements of the fluctuating fields in incompressible, homogeneous turbulence having arbitrary symmetry. For the other two possibilities, alpha is determined if the turbulence is isotropic. Author

N84-11937# JAYCOR, Alexandria, Va.
ALTERNATE IMPLOSION MODELS FOR THE PLANE PARALLEL DIODE Final Report, 1 Nov. 1980 - 1 Nov. 1981
Robert E. Terry and John U. Guillory 2 Apr. 1982 90 p refs
(Contract DNA001-79-C-0189)
(AD-A131275; DNA-6153F; J207-82-002) Avail: NTIS HC A05/MF A01 CSCL 12/2

The evolution of imploding Z-pinch plasmas in a place parallel diode is modeled in two ways through the computer code ZDIPR, described here. The first consists in a complete electromagnetic field solution via the appropriate Hertz vector potential, combined with a radiation coupled hydrodynamic solution of the Braginskii fluid equations. The second, in an approximate electrodiffusive

solution for the axial electric field, combined with the radiation coupled hydrodynamic model. The hydrodynamic solution is effected by an implicit advance of ion temperature, electron temperature plus chemical potential, and (in the electrodiffusive limit) the axial electric field. This is subcycled under the control of either a predictor/corrector or fully implicit advance of the radial fluid velocity and Lagrangian position coordinate. Radiation transport is calculated by probability of escape algorithms operating on a preselected set of frequency domains. The elcetromagnetic field advance is effected through wave equation quadrature (for Z and derivative sub tZ) followed by a numerical differentiation of this potential (smoothly interpolated to the fluid mesh) which provides E sub Z and B sub theta. GRA

N84-11938# Cornell Univ., Ithaca, N.Y.
UNIFIED THEORY OF PLASMA CORRELATIONS Interim Report
Michael A. Guillen and Richard L. Liboff 13 Jun. 1983 35 p refs
(Grant AF-AFOSR-3574-78; AF Proj. 2301)
(AD-A131478; AFOSR-83-0664TR; TR-R-4-83) Avail: NTIS HC A03/MF A01 CSCL 12/1

A unified approach to the theory of correlations in a plasma is presented, based on the BBKGY hierarchy. The theory is applied to a one-component plasma with the Coulomb interaction modified to include effects of the background. Closed integro-differential equations in space and time are obtained for the two-particle correlation function in both the strong and weak coupling limits. In the weak-coupling domain, gamma $<<1$, the time-independent analysis returns the well-known linearized Debye-Huckle result, where gamma is the plasma parameter. In the strong-coupling domain gamma >1, the resulting two-particle total correlation function exhibits decaying oscillatory behavior for particle separation of the order of the effective interparticle range. Author (GRA)

N84-11939# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
HIGH-FIELD TOKAMAKS WITH DD-DT OPERATION AND TRITIUM-BREEDING REQUIREMENTS
L. Bromberg, D. R. Cohn, E. Bobrov, N. Diatchenko, R. J. LeClaire, J. E. Meyer, and J. E. C. Williams Apr. 1983 10 p refs
(Contract DE-AC02-78ET-51013)
(DE83-013092; DOE/ET-51013/77) Avail: NTIS HC A02/MF A01

DD-DT operation could provide a significant reduction in tritium-breeding requirements in high-field Tokamak reactors without requiring very large increases in reactor size or plasma beta. Operation with the tritium-breeding requirement (BETA) = triton provided by blanket/fusion neutrons produced = 0.7-0.9 is of particular interest. The reduced tritium-breeding requirement makes possible the use of blanket designs which might be difficult to implement in a DT reactor (for example, LiAl2O3 blankets). The reduced blanket requirement could also be used for excess tritium production. Tradeoffs between tritium-breeding and plasma-performance requirements are investigated. Illustrative design features are developed for devices using both resistive magnets and superconducting magnets. Parameters for the device with superconducting magnets are B/sub T/ = 7 T, (ALPHA) = 0.063, R = 9.6 m, a = 2.4 m, (BETA) = 0.8, and P/sub wall/ = 2.2 MW/m(2). DOE

N84-11940# Department of Energy, Washington, D. C. Office of Fusion Research.
ADVANCED FUSION CONCEPTS PROJECT SUMMARIES, FY 1983
Jun. 1983 71 p refs
(DE83-013973; DOE/ER-0148/1) Avail: NTIS HC A04/MF A01

Descriptions of the activities of all the projects supported by the Advanced Fusion Concepts Branch of the Office of Fusion Energy, US Department of Energy are described. These descriptions are project summaries of each of the individual projects, and cntain the followng: title, principle investigators, fundng levels, purpose, approach, progress, plans, milestones, graduate students, graduates, other professional staff, and recent publications. The individual project summaries are prepared by the principle investigators in collaboration with the Advanced Fusion Concepts (AFC) Branch. In addition to the project summaries, statements of branch. In addition to the project summaries, statements of branch objectives, and budget summaries are also provided. DOE

N84-11941# Oak Ridge National Lab., Tenn. Fusion Energy Div.
NEOCLASSICAL TRANSPORT IN A MULTIPLE-HELICITY TORSATRON IN THE LOW-COLLISIONALITY REGIME: STRONG RADIAL ELECTRIC-FIELD LIMIT
K. C. Shaing Aug. 1983 38 p refs
(Contracts W-7405-eng-26; DE-AC02-80ER-53104)
(DE83-016463; ORNL/TM-8773) Avail: NTIS HC A03/MF A01

Analytic expressions for the neoclassical fluxes in a multiple helicity torsatron are calculated in the strong radial electric field limit, where the poloidal E-vector x B-vector drift frequency omega/sub E/ is much larger than the poloidal del B-drift frequency omega/sub del B/. The expressions are valid in the collisional frequency regime characterized by omega/sub E/ > nu/sub eff/, the effective collisional frequency for helically trapped particles. Besides the usual collisionless detrapping and boundary layer processes, a new effect arises due to the strong pitch angle dependence of the radial drift induced by par. delta epsilon/sub H//par. delta theta not equal to 0, where epsilon/sub H/ is the effective helical modulation. DOE

N84-11942# Oak Ridge National Lab., Tenn.
DIELECTRONIC RECOMBINATION: AN INTRODUCTION
Sheldon Datz 1983 8 p refs Presented at the 13th Intern. Conf. on the Phys. of Electronic and Atomic Collisions (ICPEAC), Berlin, 27 Jul. 1983
(Contract W-7405-eng-26)
(DE83-015738; CONF-830706-4) Avail: NTIS HC A02/MF A01

Atoms contained in hot plasmas which are subject to intense bombardment by electrons whose energy distribution is characterized by the plasma temperature are discussed. Collisions can cause multiple ionization of the atom and the electrons may also recombine with the ion. The distribution of ion charge states in a plasma at a given temperature depends upon the competing rates of ionization and recombination. When an unbound electron recombines the gain in potential energy must be removed in some way. Two processes are known to be important in recombination: radiative recombination (RR) in which a photon is released whose energy is exactly equal to the potential energy gain, and dielectronic recombination (DR) in which a continuum electron excites a previously bound electron and in so doing loses just enough energy to be captured into a bound state (nl). The latter process which results in a doubly excited ion in a lower charge state which may either autoionize or emit a photon resulting in a stabilized recombination is outlined. DOE

N84-11943# Argonne National Lab., Ill.
THE 21ST SYMPOSIUM ON ENGINEERING ASPECTS OF MAGNETOHYDRODYNAMICS
1983 491 p refs Symp. held at Argonne, Ill., 27 Jun. 1983; sponsored in part by DOE, AIAA and Purdue Univ.
(Contract W-31-109-eng-38)
(DE83-014481; CONF-830634) Avail: NTIS HC A21/MF A01

Separate abstracts were prepared for 37 of the 38 papers included. The following areas were covered: system and retrofit studies, operations with large test facilities, analysis and performance, electrical effects, chemical effects, disk generators, liquid metal MHD and magnets, and downstream systems. B.G.

N84-11944# California Univ., Livermore. Lawrence Livermore Lab.
LEAK TESTING AND REPAIR OF FUSION DEVICES
T. A. Kozman 17 Jun. 1983 24 p refs Presented at the 9th Intern. Vacuum Congr. and the 5th Intern. Congr. on Solid Surfaces, Madrid, 26 Sep. - 1 Oct. 1983 Submitted for publication
(Contract W-7405-eng-48)

(DE83-014942; UCRL-88945; CONF-8309103-4) Avail: NTIS HC A02/MF A01

The leak testing, reporting and vacuum leak repair techniques of the MPTF yin-yang number one magnet system, the world's largest superconducting magnet system, are discussed. Based on this experience, techniques are developed for testing and repairing leaks on the 42 MPTF-B magnets. The leak hunting techniques for the yin-yang magnet systems were applied to two helium circuits (the coil bundle and guard vacuum; both require helium flow for magnet cooldown). Additionally, during MPTF-B operation there are warm water plasma shields and piping that require leak checking. DOE

N84-11945# California Univ., Livermore. Lawrence Livermore Lab.

THERMAL ANALYSIS OF A HELIUM-COOLED TUBE-BANK BLANKET MODULE FOR A TANDEM-MIRROR FUSION REACTOR

R. W. Werner, M. A. Hoffman (California Univ., Davis), and G. L. Johnson 10 Jan. 1983 11 p refs Presented at the 21st ASME/AICHE Natl. Heat Transfer Conf., Seattle, 24-28 Jul. 1983 Submitted for publication

(Contract W-7405-eng-48)

(DE83-015840; UCRL-88360; CONF-830702-21) Avail: NTIS HC A02/MF A01

A blanket module concept for the central cell of a tandem mirror reactor is described which takes advantage of the excellent heat transfer and low pressure drop characteristics of tube banks in cross flow. The blanket employs solid Li2C as the tritium breeding material and helium as the coolant. The lithium oxide is contained in tubes arranged within the submodules as a two pass, cross flow heat exchanger. Primarily, the heat transfer and thermal hydraulic aspects of the blanket design study are described in this manner. In particular, the analytical model used for selection of the best tube bank design parameters is discussed in some detail. DOE

N84-11946# California Univ., Livermore. Lawrence Livermore Lab.

RADIOACTIVE-ION-BEAM RESEARCH AT LIVERMORE

R. C. Haight, G. J. Mathews, R. A. Ward, and S. E. Woosley Jun. 1983 26 p refs Presented at Nucl. Sci. Advisory Comm. (NSAC) Long Range Planning Session and NRC Phys. Survey Meeting, Pasadena, Calif., 1 Jul. 1983

(Contract W-7405-eng-48)

(DE83-014872; UCRL-89382; CONF-830786-1) Avail: NTIS HC A03/MF A01

The ability to produce secondary radioactive heavy ion beams which can be isolated, focused, and transported to a secondary target can enable reaction studies and other research with the approximately more than 1300 nuclei with decay lifetimes approximately more than 1 microsec. Current research in secondary beam production and future applications in astrophysics, nuclear structure, heavy ion physics, and radiotherapy are examined as well as associated spin off and technology transfer in applied physics. A.R.H.

N84-11947# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

RAPID ENERGIZATION OF ELECTRONS IN A CRITICAL VELOCITY DISCHARGE EXPERIMENT

Ingvar Axnaes and Michael A. Raadu Apr. 1983 14 p refs Presented at 16th Intern. Conf. on Phenomena in Ionized Gases, Dusseldorf, 29 Aug.-2 Sep. 1983 Sponsored by Swedish Natural Science Research Council

(TRITA-EPP-83-02; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

Light emission variation with sudden current increase was studied in a critical velocity experiment using a coaxial gun j x B discharge. The line emission was used to estimate the rate of formation of the high energy tail of the electron energy distribution. It is found that electron-electron collision processes are too slow to account for the observed characteristic time for tail formation. Collective interactions are required not only to transfer energy to the electrons, but also to deposit this energy in such a way as to form the high energy tail. Author (ESA)

N84-11948# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

THERMAL EFFECTS ON SURFACE RIPPLE CHARGES FOR WAVES ON A PLASMA COLUMN

Michael A. Raadu Apr. 1983 9 p refs Presented at 16th Intern. Conf. on Phenomena in Ionized Gases, Dusseldorf, 26 Aug.-2 Sep. 1983 Sponsored by Swedish Natural Science Research Council

(TRITA-EPP-83-03; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

A general expression including thermal effects is derived for the charge formed by ripples on the free boundary of a cylindrical plasma column. The expression reduces to the known results in the cold case. Explicit expressions with limiting forms for high temperatures are derived for the case of Maxwellian and water bag distributions. Author (ESA)

N84-11949# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

SPONTANEOUS TRANSFER OF MAGNETICALLY STORED ENERGY TO KINETIC ENERGY BY ELECTRIC DOUBLE LAYERS

L. Lindberg and S. Torven May 1983 22 p refs Sponsored by Swedish Natural Science Research Council

(TRITA-EPP-83-05; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

Current disruptions are investigated in a magnetized plasma column with an inductive external electric circuit. It is found that they persist in spite of the fact that each disruption gives rise to a large inductive overvoltage. This drops off at an electric double layer formed in the plasma where most of the magnetic energy, initially stored in the circuit inductance, is released as particle energy. Simultaneously as the current disrupts, the potential level at a local potential minimum in the plasma decreases. This is expected to cause the disruption by reflection of electrons. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N84-11950 Brown Univ., Providence, R. I.

DIFFUSIVE RELAXATION OF STRESS CONCENTRATIONS AT GRAIN BOUNDARY CAVITIES IN ELEVATED TEMPERATURE CREEP Ph.D. Thesis

Asher Asir Rubinstein 1982 92 p

Avail: Univ. Microfilms Order No. DA8228328

Elevated temperature creep cavitation of grain boundaries under cyclic and rapidly applied loading was studied. The response of partially damaged materials (where damage is represented as crack line cavities on the grain boundaries) following load alterations at relatively low stress levels and at temperatures in the vicinity of 0.5 t sub m or higher. The interaction between grain boundary diffusion and elastic deformation is important in alleviating local stress concentrations under these conditions. The stress levels considered are assumed to be low enough that plastic deformation is insignificant. Diffusive processes contribute to high temperature creep rupture by material redistribution from the void surfaces to the grain boundaries, and any nonuniform matter accommodation along the grain boundaries is accomplished by elastic deformation under the conditions assumed. Dissert. Abstr.

N84-11951 Brown Univ., Providence, R. I.

ANALYSIS OF NONUNIFORM DEFORMATION IN DUCTILE SINGLE CRYSTALS Ph.D. Thesis

Daniel Converse Peirce 1982 204 p

Avail: Univ. Microfilms Order No. DA8228315

A quantitative understanding of inhomogeneously deformed single crystals at arbitrary strain levels is studied. Each of three chapters attacks this problem by analyzing a crystal model which views simple shearing on crystallographic slip systems as the sole mechanism of plastic deformation. The rate of slipping on any system is governed by the Schmid resolved shear stress on that system and by the current slipped state. While the constitutive laws developed here apply to ductile single crystals in general, calculations are based on a tensile mode of deformation, where attention is reasonably confined to slip on at most two systems. Dissert. Abstr.

N84-11952# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PHOTOCONDUCTOR FABRICATION FOR OPERATION IN THE THERMAL INFRARED [FABRICACAO DE FOTOCONDUTORES PARA OPERACAO NO INFRAVERMELHO TERMAL]

C. Boschetti and I. N. Bandeira Aug. 1983 29 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC Submitted for publication

(INPE-2835-PRE/384) Avail: NTIS HC A03/MF A01

Pb(1-x)Sn(x)Te photoconductors were made with peak wavelength response at about 10 micrometers. The construction process involves growing the single crystal by vapor phase transport with a liquid-solid interface, annealing the (100) oriented samples in saturated atmosphere for carrier concentration reduction, deposition of ohmic contacts, and device characterization. The detectors show detectivities comparable these reported in the literature for Pb(0,80)Sn(0,20)Te photoconductors operated at 77K. Author

N84-11953# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A CLUSTER MODEL FOR TWO-DIMENSIONAL DISORDERED SYSTEMS

A. Ferreira daSilva and M. Fabbri Sep. 1983 17 p refs Submitted for publication

(INPE-2895-PRE/414) Avail: NTIS HC A02/MF A01

The two-dimensional (2D) electron hopping energy integral was investigated in order to calculate the impurity density of states of doped semiconductors. A cluster model is outlined for the two-dimensional disordered system. It is shown that the hopping matrix is very sensitive to a change in the dimensionality of the system, i.e., from 3D to 2D system. The impurity band is symmetric and has a considerable bandwidth for high concentration, while for low concentration it is drastically reduced by the cut off of the long-range hopping energy. The results of other models are discussed. Author

N84-11954# Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.

MATRIX CALIBRATION FOR THE QUANTITATIVE ANALYSIS OF LAYERED SEMICONDUCTORS BY SECONDARY ION MASS SPECTROMETRY

Alan A. Galuska and George H. Morrison 27 Jul. 1983 32 p refs

(Contract N00014-80-C-0538)

(AD-A130972; TR-10; TR-11) Avail: NTIS HC A03/MF A01 CSCL 20/12

Analyses of AlxGa1-xAs matrices by secondary ion mass spectrometry (SIMS) have shown that secondary ion yields and sputtering yields are linearly dependent on the sample composition. Calibration lines for Be, Si, B, P, and As were obtained using practical ion yields, relative sensitivity factors, and relative ion yields. Calibration lines using relative ion yields provided superior precision and accuracy. Relative ion yield and relative sputtering yield calibration lines were applied to the determination of a 11B+ implant into a multilayer-multimatrix sample. Author (GRA)

N84-11955# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical Computer and Systems Engineering.

SEMICONDUCTOR SURFACE CHARACTERIZATION USING TRANSVERSE ACOUSTOELECTRIC VOLTAGE VERSUS VOLTAGE MEASUREMENTS Annual Report, 1 Aug. 1981 - 31 Oct. 1983

B. Davari and Pankaj K. Das Oct. 1982 9 p refs

(Grant AF-AF0SR-3426-77; AF Proj. 2306)

(AD-A131347; AFOSR-83-0646TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

An alternative to Capacitance-Voltage (C-V) measurement is experimentally demonstrated. This technique measures the Transverse Acoustoelectric Voltage (TAV) as a function of applied D.C. voltage across the semiconductor. The technique is non-destructive and is applied to uniformly doped Si samples. Surface properties such as the flat band voltage, oxide charge and the zero bias surface condition are determined. P.S. An annual interim report is being accepted as the Final report for AFOSR-77-3426. The technical effort is being continued for one year under AFOSR-82-0281. The Final report for this continuation will contain more overall detail and should be considered as the final report for the entire technical effort. Author (GRA)

N84-11956# Tennessee Univ., Knoxville. Dept. of Physics.

NONLINEAR ELASTIC BEHAVIOR OF PIEZOELECTRIC TRIGONAL CRYSTALS: MEASUREMENTS ON QUARTZ AND LINbO3 Interim Technical Report

Paul Jerry Latimer Jun. 1983 112 p refs

(Contract N00014-81-K-0229)

(AD-A131350; TR-23) Avail: NTIS HC A06/MF A01 CSCL 09/1

The ultrasonic harmonic generation technique previously used to measure third-order elastic (TOE) constants of crystals of cubic symmetry has been extended to measurement of crystals of trigonal symmetry. The theory for nonpiezoeletric trigonal crystals of J. Phillip has been combined with the piezoelectric theory of McMahon to determine the effective TOE constants in a piezoelectric solid, and a correction has been made to McMahon's expression. GRA

N84-11957# Wisconsin Univ., Madison. Dept. of Chemistry.

EXCITED-STATE PROCESSES OF RELEVANCE TO PHOTOELECTROCHEMISTRY

Arthur E. Ellis 26 Jul. 1983 13 p refs

(Contract N00014-78-C-0633)

(AD-A131300; UWIS/DC/TR-83/1) Avail: NTIS HC A02/MF A01 CSCL 20/12

The excited-state properties of semiconductor electrodes play a crucial role in photoelectrochemistry. Luminescence offers a means for characterizing the electronic structure and excited-state decay routes of semiconductors employed in PECs and underscores their relationship to electrochemistry: PL can be perturbed and EL initiated by charge-transfer events occurring at the semiconductor-electrolyte interface. Author (GRA)

N84-11958# Wisconsin Univ., Madison. Dept. of Chemistry.

PHOTOLUMINESCENT PROPERTIES OF n-GaAs ELECTRODES: APPLICATIONS OF THE DEAD-LAYER MODEL TO PHOTOELECTROCHEMICAL CELLS

William S. Hobson and Arthur B. Ellis 26 Jul. 1983 20 p refs

(Contract N00014-78-C-0633)

(AD-A131301; UWIS/DC/R-83-2) Avail: NTIS HC A02/MF A01 CSCL 20/12

Single-crystal samples of n-type GaAs have been used as electrodes in photoelectrochemical cells (PECs) employing aqueous ditelluride electrolyte. Photoluminescence (PL) from the electrodes can be quenched by the electric field present in the semiconductor during PEC operation. The extent of PL quenching, studied as a function of carrier concentration, excitation wavelength, and applied potential, is consistent with the dead-layer model previously used to describe PL quenching in semiconductor/metal, Schottky-barrier systems. PL quenching curves calculated by assuming that the dead-layer thickness varies with applied potential in the same manner as the depletion widths differ from the experimental data, particularly in the region near the flat-band potential. Sources of these discrepancies are discussed, including the possibility that relative PL intensity reflects the manner in which applied potential

is partitioned across the semiconductor-electrolyte interface.
Author (GRA)

N84-11959# Geoscience, Ltd., Solana Beach, Calif.
THERMAL PROPERTY MEASUREMENT TECHNIQUES AND SOME RESULTS FOR CdTe Quarterly Report, 10 Mar. - 10 Jun. 1983
H. F. Poppendiek, D. J. Connelly, and R. K. Livett 10 Jun. 1983 28 p
(Contract MDA903-83-C-0056; ARPA Order 4733)
(AD-A131455; GLM-322; QR-1) Avail: NTIS HC A03/MF A01 CSCL 20/12

The objective of this study is to measure the thermal properties of several semiconductor materials. Some of the materials of interest are mercury telluride, cadmium telluride and gallium arsenide. The thermal properties to be measured include thermal conductivity, specific heat, coefficient of expansion, heat of fusion and emissivity. These properties are to be measured over a range of temperature levels. Because of the range of temperature levels required, some modification of equipment is underway. A literature review has been made to find existing data on the thermal properties of semiconductors; it has been found that little data exists. The thermal properties are being measured in the laboratory using equipment described in the report. The thermal conductivity is measured using the guarded hot plate method, the specific heat and heat of fusion is measured using a gradient layer calorimeter, the expansion coefficient is measured using a quartz dilatometer and the emissivity is measured using a two disc system that is described in the report. GRA

N84-11960# Arizona State Univ., Tempe. Dept. of Physics.
ATOMIC AND ELECTRONIC STRUCTURE OF DEFECTS IN SEMICONDUCTORS Final Report, 1 Apr. 1980 - 31 May 1983
J. C. H. Spence Aug. 1983 6 p refs
(Contract DAAG29-80-C-0080)
(AD-A131539; ARO-16885.19-MS) Avail: NTIS HC A02/MF A01 CSCL 20/12

This research was aimed at developing new techniques for the characterization of sub-micron defects in semiconductors by electron beam methods. A brief summary of the main results and a list of publications are included. Author (GRA)

N84-11961# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.
CRYOGENIC SYSTEM FOR A SUPERCONDUCTING SPECTROMETER
John Porter 1983 3 p Presented at the Particle Accelerator Conf. on Accelerator, Eng. and Technol., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC03-76SF-00098)
(DE83-012995; LBL-15100; CONF-830311-168) Avail: NTIS HC A02/MF A01

The Heavy Ion Spectrometer System (HISS) relies upon superconducting coils of cryostable, pool boiling design to provide a maximum particle bending field of 3 tesla. The cryogenic facility including helium refrigeration, gas management, liquid nitrogen system, and the overall control strategy are described. The system normally operates with a 4 K heat load of 150 watts; the LN2 circuits absorb an additional 4000 watts. The 80K intercept control is by an LSI 11 computer. Total available refrigeration at 4K is 400 watts using reciprocating expanders at the 20K and 4K level. The minicomputer has the capability of optimizing overall utility input cost by varying operating points. A hybrid of pneumatic, analog, and digital control is successful in providing full time unattended operation. The 7m diameter magnet/cryostat assembly is rotatable through 180 degrees to provide a variety of spectrometer orientations. DOE

N84-11962# General Atomic Co., San Diego, Calif.
SUPERCONDUCTING MAGNETS FOR GYROTRON TUBES
Y. H. Hsu, J. Purcell, and R. Prater Dec. 1982 5 p refs Presented at the Appl. Superconductivity Conf., Knoxville, Tenn., 30 Nov. - 3 Dec. 1982
(Contract DE-AT03-76ET-51011; GA Proj. 3235)
(DE83-012815; GA-A-16922; CONF-821108-29) Avail: NTIS HC A02/MF A01

Six superconducting magnet systems were designed and built for gyrotron tubes. The systems are installed on the General Atomic Doublet III Tokamak fusion device for radio frequency heating. They will initially operate at 60 GHz requiring a 2.5 T field, but the magnets can be operated to 5 T for possible upgrade to 120 GHz. Key design features include high precision coil winding, high precision coil positioning (concentric with bore), low helium boil off rate, and 1 week operating time without refilling. A low operating current of 7 A for 60 GHz operation was selected for reducing the heat leak through the power leads. Aluminum tape and superinsulation are utilized to decrease the radiation heat leak. The overall dimensional constraint makes it difficult to keep the helium boil off rate very low. Two systems were operated with 60 GHz gyrotron tubes. The tubes are brought up to full power and it is found that the performance of the magnet is satisfactory. DOE

N84-11963# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.
THE TECHNOLOGY OF SUPERCONDUCTING ACCELERATOR DIPOLES
W. V. Hassenzahl, R. B. Meuser, and C. Taylor 1983 75 p refs Presented at the 2nd Summer School on High-Energy Particle Accelerators, Stanford, Calif., 2-13 Aug. 1982
(Contract DE-AC03-76SF-00098)
(DE83-016470; LBL-15987; CONF-8208147-2) Avail: NTIS HC A04/MF A01

Accelerator dipoles and their characteristics are discussed. Other types of magnets, in particular bubble chamber magnets, are found to be successful. The performance is based on cryogenic stability which is addressed only briefly in this chapter. It is found that this type of stability is not available to the accelerator designer because of the large quantities of copper or other stabilizer that would reduce the current density in the windings to an unacceptably low value. DOE

N84-11964# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
STRUCTURAL STUDIES OF AMORPHOUS Mo-Ge ALLOYS THROUGH THE SEMICONDUCTOR-METAL TRANSITION
Jeffrey Kortright and Arthur Bienenstock 1983 5 p refs
(Contract DE-AC03-82ER-13000)
(DE83-016525; DOE/ER-13000/T1) Avail: NTIS HC A02/MF A01

Changing atomic scale structure through the semiconductor-metal transition in amorphous Mo-Ge films has been studied with RDP, differential anomalous scattering, EXAFS and small-angle scattering techniques. Mo remains most closely coordinated by Ge through this structural transition, with no evidence for separation into well-defined amorphous phases on a size scale of 20 A and up. All evidence of the a-Ge network has disappeared by about 23% Mo. DOE

N84-11965# Sandia Labs., Albuquerque, N. Mex.
EFFECTS OF PRESSURE ON DEEP ELECTRONIC LEVELS IN SEMICONDUCTORS
G. A. Samara and C. E. Barnes 1983 4 p refs Presented at the 9th AIRAPT Conf., Albany, N.Y., 25 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-016247; SAND-83-0294C; CONF-830763) Avail: NTIS HC A02/MF A01

The effects of hydrostatic pressure on the properties of deep electronic levels in semiconductors were investigated using the techniques of transient capacitance spectroscopy. Results on the gold acceptor level in Si and the deep A and R hole traps in LPE GaAs are presented and discussed to illustrate the usefulness of such studies. DOE

N84-11966# Hebrew Univ., Jerusalem (Israel). School of Applied Science and Technology.

CRYSTAL GROWTH AND APPLICATIONS OF MERCURIC IODIDE

M. Schieber, M. Roth, and W. F. Schnepple (Edgerton, Germeshausen and Grier, Inc., Goleta, Calif.) 1983 4 p refs Presented at the 7th Intern. Conf. on Crystal Growth, Stuttgart, 12 Sep. 1983

(Contract DE-AC08-83NV-10282)

(DE83-016731; S-242-TP; CONF-830927-2) Avail: NTIS HC A02/MF A01

A brief summary is given of the crystal growth of mercuric iodide, a high-Z wide bandgap semiconductor suitable as a low noise, room temperature X-ray and gamma ray detector. The state of the art of the synthesis and purification of the starting material, mechanical properties and dislocation structure of HgI2, and recent success in the development of thick HgI2 spectrometers are summarized and reviewed. DOE

N84-11967# Hughes Research Labs., Malibu, Calif.

KINETICS OF SOLID-PHASE CRYSTALLIZATION IN ION-IMPLANTED AND DEPOSITED AMORPHOUS-SILICON FILMS

G. L. Olson, J. A. Roth, L. D. Hess, and J. Narayan (ORNL) 1983 51 p refs Presented at the US/Japan Seminar on Solid Phase Epitaxy and Interface Kinetics, Oiso, Japan, 20-24 Jun. 1983

(Contract W-7405-eng-26)

(DE83-015499; CONF-8306102-1) Avail: NTIS HC A04/MF A01

Expitaxial growth kinetics in ion-implanted and UHV-deposited amorphous-silicon films on Si (100) substrates is reviewed. Crystallization kinetics are measured during laser heating, and microstructural changes are investigated. From 4750C to 13500C and rates from .01 A/sec to 10(8) A/sec, solid-phase epitaxy (SPE) is well described by an Arrhenius expression. Kinetics parameters are determined for intrinsic SPE in self-implanted and UHV-deposited amorphous films; deviations from intrinsic behavior caused by the addition of B, P, F, and As are studied as a function of interface position from 500 to 10000C. Effects of dopant compensation, temperature-dependent kinetic competition between SPE and precipitate formation in asenic-implanted films, and the combined effects of rate retarding (F) and rate-enhancing (B) impurities are reported. Finally, SPE rates in excess of 10(8) A/sec above 13500C are discussed with respect to a proposed depression in the Si(a) melting temperature. DOE

N84-11968# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany).

FABRICATION OF STRUCTURES ON SEMICONDUCTORS BY X-RAYS: COMPARISON AND OPTIMIZATION OF MASK TECHNOLOGIES Final Report, Dec. 1980

Hans Betz, Laslo Csepregi, Anton Heuberger, Siegfried Pongratz, and Bernd Schubert Bonn Bundesministerium fuer Forschung und Technologie May 1983 196 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-071; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36,10

Mask technology for X ray lithography is treated. The exposure properties of conventional X ray lithography were investigated, using an aluminum rotary anode tube. Silicon and silicon oxynitride were studied as substrate material. The sensitivity, resolution and contrast of X ray resists were investigated using an X ray tube. It is concluded that the processing advantages of X ray lithography can quickly become a provisional solution for fabrication of structures on semiconductors, but that X ray tubes are not suitable for extremely small structures (< 1 micron) i.e., very high resolution applications. Author (ESA)

N84-11969# Max-Planck-Institut fuer Festkoerperforschung, Stuttgart (West Germany).

SILICON LIQUID PHASE EPITAXY WITH SOLUTION TRANSPORT BY CENTRIFUGAL FORCES AND INVESTIGATION AND CHARACTERIZATION OF SILICON EPITAXIAL LAYERS BY TRANSMISSION ELECTRON MICROSCOPY Final Report, Feb. 1982

Elisabeth Bauser and Horst Strunk (Max-Planck Inst. fuer Metallforschung) Bonn Bundesministerium fuer Forschung und Technologie May 1983 57 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-097; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,20

Solution growth of thin epitaxial layers of silicon is outlined. After determination of growth parameters using a tipping growth system, a liquid phase epitaxy apparatus was built in which the solutions are rapidly transported by centrifugal forces. The growth parameters determined by the preliminary tests were obeyed in the centrifugal system. The quality of the epitaxial layers from the centrifugal apparatus were similar to those grown in the tipping system. Layers grown from Ga or in solutions were free of defects. They were p-type with carrier concentration of 10 to the 19th to 20th power/cucm grown from Ga and of 2 times 10 to the 15th power/cucm when grown from In. When grown from Sn, the layers always contained dislocations (due to misfit stresses) and stacking faults. Author (ESA)

N84-11970# AEG-Telefunken, Ulm (West Germany). Fachbereich Technische Roehren.

DEVELOPMENT OF LARGE AREA MULTI-COLOURED MULTI-FUNCTIONAL DISPLAYS (MFA) IN LIQUID CRYSTAL TECHNOLOGY Final Report, Dec. 1981

Josef Briegel, Kurt Fahrenschon, Hildegard Keiner, Otto Marzel, Wilhelm Schwedes, Juergen Steinbeck, and Wolfram Wiemer Bonn Bundesministerium fuer Forschung und Technologie May 1983 159 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-098; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,50

Large area liquid crystal displays for automotive application including corresponding flat illumination systems and methods for integrating the driver IC's on the liquid crystal cell are discussed. Manufacturing technologies applicable for large quantity series production were worked out, and prototypes were delivered to the automotive industry, mainly the dynamic scattering mode and field effect displays (twisted nematic). The twisted nematic displays are preferred for automotive applications. Author (ESA)

N84-11971# Max-Planck-Institut fuer Festkoerperforschung, Stuttgart (West Germany).

RESEARCH ON DIFFUSION AND COMPLEX BEHAVIOR OF ELEMENTS FORMING RECOMBINATION CENTERS IN SILICON BY MEANS OF OPTICAL AND ELECTRICAL MEASUREMENT TECHNIQUES Final Report, Jul. 1981

Peter Wagner, Karl-Heinz Froehner, and Klaus Wuenstel Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 115 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-117; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24

Electrical and optical parameters of impurities in iron-doped silicon are studied. A definite identification of Fe in silicon with concentrations < 10 to the 16th power/cucm was stressed. Electrical (Hall-effect, deep level transient spectroscopy) and optical (photoconductivity, photocapacitance, photoluminescence) methods were employed. Thermal and optical ionization energies were determined. For interstitial iron deep level transient spectroscopy: Ev + 0,39 + or - 0,02 eV, Hall-effect : Ev + 0,37 eV, photoconductivity and photocapacitance : Ev + 0,38 eV respectively Ec - 0,78 eV. Author (ESA)

N84-11972# AEG-Telefunken, Heilbronn (West Germany). Fachbereich Elektronische Bauelemente.

DOPANTS PROFILING TECHNIQUES IN SEMICONDUCTOR TECHNOLOGY Final Report, Apr. 1981

Guenter Goldbach, Ekkehard Roesch, and Detlev Wallis Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 108 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-126; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23

Secondary ion mass spectrometry, spreading resistance measurement, and capacitance voltage measurement with Hg-blocking contact are compared. Principle of function, peculiarities and specific problems of these methods are described as well as instances of field experience for semiconductor development and production control. It is concluded that the methods supplement each other and are necessary for the semiconductor processes.
Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N84-11973# Los Alamos Scientific Lab., N. Mex.
THE POSSIBLE UNIFYING EFFECT OF THE DYNAMIC THEORY
Pharis E. Williams May 1983 121 p refs
(Contract W-7405-eng-36)
(DE83-014082; LA-9623-MS) Avail: NTIS HC A06/MF A01

The tentative results of recent research during which a neocoulombic electrostatic force of the form (k/r(2)) (1-lambda/r) exp(-lambda/r) was derived is presented. This neocoulombic force offers a possible alternative explanation of nuclear phenomena without the necessity for postulating the existence of nuclear forces, and it allows the prediction of nuclear masses. The result is a view of physics in a five dimensional manifold of space, time, and mass density in which the gauge field includes gravitational and electromagnetic components coupled by a single system of eight differential equations, quantum effects occur as the result of a restrictive assumption, and nuclear phenomena result from the new form for the electrostatic force. Also, the geometrical effect on the unit of action in quantum mechanics is presented, the self-energy of charged particles is calculated, and experimental tests of the theory are suggested. DOE

N84-11974# Oak Ridge National Lab., Tenn.
REVIEW OF STIRLING-ENGINE MATHEMATICAL MODELS
N. C. J. Chen and F. P. Griffin Aug. 1983 39 p refs
(Contract W-7405-eng-26)
(DE83-016454; ORNL/CON-135) Avail: NTIS HC A03/MF A01

A review of existing mathematical models for Stirling engine thermodynamic analysis was performed. Twenty-five models were identified through extensive literature search; 19 of these were published in sufficient detail for review. Each individual model's assumptions, limitations, predictability, and applicability were assessed by using a two part review format consisting of model description and validation. According to their design methods, models were grouped into four categories by degree of sophistication: approximate (first order) methods, decoupled (second order) methods, nodal (third order) analyses, and method of characteristics. The salient characteristics of the models were summarized in two tables for cross reference. DOE

N84-11975# Los Alamos Scientific Lab., N. Mex.
SPECIAL FUNCTIONS AND GROUP THEORY IN THEORETICAL PHYSICS
L. C. Biedenharn, R. A. Gustafson, M. A. Lohe, J. D. Louck, and S. C. Milne 1983 36 p refs Presented at the Conf. on Spec. Functions in Group Theory, Oberwolfach, West Germany, 13-19 Mar. 1983
(DE83-015642; LA-UR-83-2162; CONF-830382-1) Avail: NTIS MF A01

The subject of special functions, even where restricted to the narrower subject of special functions in theoretical physics, is far too broad for one to attempt any meaningfully complete survey. The important main themes in the subject were reviewed. Recent advances broaden and extend these themes. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N84-11976# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
DECENTRALIZED CONTROL OF SCHEDULING IN DISTRIBUTED PROCESSING SYSTEMS Semiannual Report, 15 Dec. 1982 - 15 Jun. 1983
John A. Stankovic 20 Jun. 1983 80 p refs
(Contract DAAB07-82-K-J015)
(AD-A131548) Avail: NTIS HC A05/MF A01 CSCL 05/1

This semi-annual report details the research program made in the area of distributed control of scheduling using Bayesian Decision Theory. Three decision algorithms were simulated and results compared. Author (GRA)

N84-11977# Argonne National Lab., Ill. Engineering Div.
PROJECT MANAGER'S GUIDE
John J. English and George A. Whittington, ed. Jun. 1983 172 p refs
(Contract W-31-109-eng-38)
(DE83-014454; ANL/ENG-PMS0-02) Avail: NTIS HC A08/MF A01

Guidance to ANL project managers is provided. Project management policy and procedures are provided by the ANL Policy Manual System. ANL management, at an appropriate level commensurate with the size, complexity and sensitivity of a project, assigns responsibilities and establishes project management requirements for individual projects. With management approval, the project manager selects the specific management tools and procedures that he will utilize in the execution of the project. This guide describes an approach to project management that is intended to assist him in the selection process. DOE

N84-11978# Urban Inst., Washington, D.C.
MOTIVATING MANAGERS: A GUIDE TO PERFORMANCE TARGETING AND PERFORMANCE-BASED PAY IN STATE AND LOCAL GOVERNMENTS
Harry P. Hatry, John M. Greiner, Richard Gollub, Ken Steil (Public Technology, Inc.), and Mary Quagliana (Public Technology, Inc.) 1982 189 p refs
(Grants OPM-79-DX-08; NSF DAR-78-261622)
(PB83-237834; HUD-0002841) Avail: NTIS HC A09/MF A01 CSCL 05I

The assumptions behind performance targeting programs, and appropriate criteria for measuring their success are discussed. Also the impacts resulting from actual trials of the approach are presented along with findings from an examination of four trial programs. The issues and tactics which should be considered if performance targeting is to be instituted in an organization are discussed. The entire presentation emphasizes theories of motiva-

tion and increased input into decisionmaking that affect work performance. GRA

N84-11979# National Academy of Engineering, Washington, D.C. Ad Hoc Committee on Government-University Relationships in Support of Science.
STRENGTHENING THE GOVERNMENT-UNIVERSITY PARTNERSHIP IN SCIENCE
Apr. 1983 256 p Sponsored in part by the Lounsbery Foundation, the White House Office of Science and Technology Policy, the Alfred P. Sloan Foundation, the Rockefeller Foundation and the William and Flora Hewlett Foundation
(PB83-230870; ISBN-0-309-03380-2; LC-83-61258) Avail: NTIS HC A12/MF A01 CSCL 05A

The history of the government-university partnership and its dramatic evolution in the post-World War II period is outlined. Areas of tension are discussed. These areas include graduate education science and engineering, accountability, cost sharing and indirect costs, university research capacity, and industry-university relations as affected by government. A new and independent body, the Government-University Forum is proposed to improve communication between the partners and facilitate solutions to problems they share and will share in the future. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N84-11980 National Technical Information Service, Springfield, Va.
CORPORATE AUTHOR AUTHORITY LIST, 1983 Annual Report
1983 1453 p
(PB83-156034; NTIS/CAAL-83) Copyright. Avail: NTIS HC $175.00 CSCL 05B

Prepared as a standard for corporate author entries, this list has more than 35,000 main entries, including all the corporate authors used and verified at NTIS for the past 7 years. Cross reference triple the number of entries. The format shows the parent organization, the location, and the smallest appropriate sub-organization. Former names of an organization are included, both under the current name and in the alpha listing with referral to the present name. The AACR2 versions of the names are given when they have been located. The NTIS source codes, (logical sequence numbers) are included; other agency source codes are given when the name is used by NTIS (i.e., Department of Defense (DTIC), Department of Energy (DOE), and National Aeronautics and Space Adminstration (NASA). The codes are a valuable aid in machine retrieval. To be updated periodically, this reference tool should benefit information specialists and librarians as well as individual researchers. A.R.H.

N84-11981*# Franklin Research Center, Philadelphia, Pa. Systems Technology Dept.
OPERATION OF THE POWER INFORMATION CENTER: PERFORMANCE OF SECRETARIAT FUNCTIONS AND INFORMATION EXCHANGE ACTIVITIES IN THE ADVANCED POWER FIELD OF THE INTERAGENCY ADVANCED POWER GROUP Annual Report, 15 Sep. 1982 - 14 Sep. 1983
15 Sep. 1983 27 p
(NASA-CR-174570; NAS 1.26:174570; AR-5) Avail: NTIS HC A03/MF A01 CSCL 05B

Highlights of activities conducted during the reporting period to facilitate the exchange of technical information among scientists and engineers both within the federal government and within industry are cited. Interagency Advanced Power Group meetings and special efforts, project briefs, and organization development are considered. A.R.H.

N84-11982# Naval Research Lab., Washington, D. C.
THE HISTORICAL RECORDS OF THE NAVAL RESEARCH LABORATORY: A GUIDE FOR RESEARCHERS Final Report
J. A. S. Pitts 18 Jul. 1983 22 p
(AD-A131620; AD-E000537; NRL-MR-5109) Avail: NTIS HC A02/MF A01 CSCL 05/4

The report describes the archival and oral history collections of the Naval Research Library, the depositories in which they are located, and the procedures which must be followed in order to use them. The report includes a selected bibliography of published materials relating to the history of naval research, the histories of Navy laboratories, and the history of NRL. GRA

N84-11983# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
PHOTOVOLTAICS ADVANCED RESEARCH AND DEVELOPMENT BIBLIOGRAPHY Report, Oct. 1980 - Dec. 1981
Feb. 1983 42 p
(Contract DE-AC02-77CH-00178)
(DE83-009399; SERI/SP-281-1899) Avail: NTIS HC A03/MF A01

Bibliographic citations are provided covering work performed on: amorphous silicon high efficiency materials, polycrystalline thin films, polycrystalline silicon, photoelectrochemical cells, solid state research, photovoltaic devices and measurements, renewable resource assessment, and advanced photovoltaic systems research. A descriptive introduction is given for each of these technologies prior to the listing of publications, conference proceedings, patents, technical reports, theses and dissertations, and presentations and lectures. DOE

N84-11984# Technical Information Center, Oak Ridge, Tenn.
SUBJECT CATEGORIES WITH SCOPE DEFINITIONS AND LIMITATIONS
David E. Bost, ed. Aug. 1983 62 p
(DE83-008754; DOE/TIC-4584/R5) Avail: NTIS HC A04/MF A01

Citations entered into DOE's computerized bibliographic information system are assigned six-digit subject category numbers to broadly group information for storage, retrieval, and manipulation. These numbers are used in the preparation of printed documents, such as bibliographies and abstract journals, to arrange the citations and to aid searching on the DOE/RECON on-line system. This document has been prepared for use by (1) those individuals responsible for the assignment of category numbers to documents being entered into the Technical Information Center (TIC) system, (2) those individuals and organizations processing magnetic tape copies of the files, (3) those individuals doing on-line searching for information in TIC-created files, and (4) others who, having no access to RECON, need a printed copy. DOE

N84-11985# Siemens A.G., Munich (West Germany). Abteilung Systemarchitektur.
TECHNIQUES FOR INTEGRATED TEXT AND IMAGE PROCESSING AND COMMUNICATION Final Report, Jan. 1982
Bernhard Bergmann, Wolfgang Horak, Claudia Kutscher, Wolfgang Postl, Edward Scheiterer, and Walter Looborschil Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 193 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-104; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36

Document preparation by an experimental text/image work station (Textfax) on the basis of a functionally structured, modular multimicrocomputer system is treated. Techniques were developed to process mixed text/image documents interactively in a single multifunctional work station and to mail them by means of a combined text-facsimile transmission instead of using a word processor, copier, pencil, scissors, glue, Teletex, and Telefax. On

a raster display, A4-documents can be displayed with facsimile Group 3 resolution (1728 x 2288 pixels), black and white and gray-scale facsimiles can be shifted, turned, enlarged and mixed with text of multiple type and size. Printed images can be entered by an intelligent scanner and handgraphics by a tablet. The documents are locally printed and locally stored using compression codes. Author (ESA)

N84-11986# Saarland Univ., Saarbrucken (West Germany). Informationswissenschaft.
CTX: A SYSTEM FOR COMPUTER-AIDED INDEXING Final Report, Feb. 1982
Harald H. Zimmermann, Edith Kroupa, Gerald Keil, Frank W. Felzmann, Ursula Hahl, Manfred Jahn, Peter Rosenbeck, and Dorothea Viets Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 192 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-ID-83-006; ISSN-0170-8996) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36

Computer aided analysis of texts on the basis of their linguistic content for information retrieval is reviewed. The question of whether preparation of large text corpora is amenable to linguistic methodology, criteria for evaluating the potential of the technique on the basis of a sufficiently large corpus selected from the field of legal rights (data protection) and the implementation of a prototype system were investigated. The effectiveness of different systems was compared, but no absolute proof of superiority of one system is established. Author (ESA)

N84-11987# General Accounting Office, Washington, D. C. General Government Div.
GUIDANCE NEEDED IF BETTER FREEDOM OF INFORMATION ACT COSTS REPORTS ARE DESIRED
22 Jun. 1983 31 p
(PB83-242040; GAO/GGD-83-71; B-173761) Avail: NTIS HC A03/MF A01 CSCL 05C

A precise determination of direct and indirect costs of implementing the Freedom of Information Act is not possible because agencies generally lack detailed supporting records. Costs of over $61 million were identified mainly from agencies' 1981 annual reports. The reports vary widely in the ways costs are categorized and measured but provide an indicator of total cost. Inquiries at four agencies that have over 50 percent of the reported costs show they are attempting to capture most personnel costs, the largest category of costs incurred. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N84-11988# Committee on Science and Technology (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION, 1984, VOLUME 2
Washington GPO 1983 1659 p Hearings before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 17, 3, 8, 10, 22-26 Feb.; 1-3 Mar. 1983
(GPO-19-605) Avail: Subcommittee on Space Science and Applications

The agency's budget requests are examined in the light of Congressional cncerns both with regard to program balance between space flight activities and space science, applications, and aeronautics activities and with regard to the balance of program thrust between civil and military activities. Funding of the space transportation system and of continuing programs in space science and applications are discussed. Important new starts discussed include: the numerical aerodynamics simulator, the fifth orbiter, advanced communications technology; the Venus radar mapper; the upper atmosphere research satellite, and the tethered satellite. The space station definition effort is also explored. A.R.H.

N84-11989# Committee on Government Operations (U. S. House).
PAPERWORK REDUCTION ACT AMENDMENTS OF 1983
Washington GPO 1983 40 p Presented to the Comm. of the Whole House on the State of the Union, 98th Congr., 1st Sess., 1983
(H-Rept-98-147; GPO-20-580) Avail: US Capitol, House Document Room

A requirement of section 3504 of title 44 of the United States Code requires the OMB Director to appoint a trained and professionally experienced Chief Statistician to be responsible for the statistical policy and coordination functions previously assigned to the Director. In addition to being charged with fulfilling previously mandated responsibilities, the Chief Statistician is also required to integrate the statistical functions with other information resources management functions performed by the Administration of the Office of Information and Regulatory Affairs within the OMB. A.R.H.

N84-11990# Committee on Science and Technology (U. S. House).
NATIONAL SCIENCE FOUNDATION AUTHORIZATION, 1984 AUTHORIZATION
Washington GPO 1983 746 p refs Hearings on H.R. 2066 before the Subcomm. on Sci. and Technol. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 21, 23, 25 Feb.; 1, 8, 10 Mar. 1983
(GPO-21-280) Avail: Subcommittee on Science and Technology

Policies and activities of the National Science Foundation are examined as well as research initiatives for the coming decade. Funding for science education at all levels and opportunities for women in research are among the issues examined. A.R.H.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N84-11991# Ohio State Univ., Columbus. Dept. of Mechanical Engineering.
AN EXPERIMENTAL STUDY OF AN ULTRA-MOBILE VEHICLE FOR OFF-ROAD TRANSPORTATION Semiannual Technical Report, 1 Oct. 1982 - 31 Mar. 1983
Robert B. McGhee and Kenneth J. Waldron Jul. 1983 300 p refs
(Contract MDA903-82-K-0058)
(AD-A131449) Avail: NTIS HC A13/MF A01 CSCL 13/6

This report summarizes research accomplished during the third six-month period of this three-year project. The research is aimed at field testing of an experimental vehicle making use of actively-controlled suspension units. The current design concept envisages locomotion without the use of wheels or tracks, employing six active suspension elements, each providing support and propulsion analogously to a biological leg. This report describes a functioning breadboard leg and the associated vehicle frame. A scale model photograph is included to illustrate one candidate vehicle configuration. Electrical system research has produced a

breadboard computing system containing thirteen single-board computers (Intel 86/30). Breadboard software has been validated in simulation. Fusion of optically-sensed range data with other types of sensor information to provide automatic vehicle guidance in rough-terrain locomotion has been demonstrated experimentally in a laboratory-scale hexapod walking machine. An extensive appendix provides full details regarding this result. GRA

N84-11992# Transportation Advisors, Inc., Fort Lauderdale, Fla.
SERVICES TO CONDUCT SEMINARS ON TRUCK FUEL ECONOMY FOR FLEET OWNERS AND OWNER OPERATORS Final Report
[1983] 73 p
(Contract DE-AC01-80CS-50184)
(DE83-013365; DOE/CS-50184/T1) Avail: NTIS HC A04/MF A01

An educational program for fuel conservation for truck fleet owners and operators is discussed. The intent of the program was to reach two audiences: dealers and owner operators and small fleets. The aim was to educate the dealer so he in turn can relay the information to the truck buyers (owner operators), and secondly, educate the users (owner operators) on a first hand basis. The program was accomplished by conducting information/education programs utilizing two elements as dissemination channels, the dealer and the truck stop. DOE

N84-11993# Tennessee Valley Authority, Chattanooga. Div. of Energy.
A MICROPROCESSOR-BASED RANGE METER FOR ELECTRIC VEHICLES
A. Scott Keller and Frank H. Klein (Gesellschaft fuer Elektrischen, Strassenverkehr) 1983 9 p refs
(DE83-902237; TVA/OP/EDT-83/23) Avail: NTIS HC A02/MF A01

A Range Prediction Device (RPD) for electric vehicles (EVs) was tested at the Electric Vehicle Test Facility in Chattanooga, Tennessee. Designed and constructed by the University of Aachen in West Germany, the RPD provides the V driver with a real-time estimate of remaining vehicle range calculated from compensated ampere-hour measurements. Background information concerning the development of the RPD is included as well as theory of operation, user comments, and test procedures and results. Three different types of tests conducted in a Volkswagen Electrotransporter bus were used to simulate driving conditions and situations: real world (city and highway driving), 56-km/h constant speed, and the SAE J227a C cycle. Test results were plotted and compared with theoretical values for accuracy. DOE

N84-11994# Eagle-Picher Co., Joplin, Mo.
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-IRON BATTERIES FOR ELECTRIC-VEHICLE PROPULSION Annual Report, 1982
May 1983 37 p refs
(Contract W-31-109-eng-38)
(DE83-014270; ANL/OEPM-83-7) Avail: NTIS HC A03/MF A01

The objective of the work reported is to develop a nickel-iron battery system suitable for use in the propulsion of electric and electric/hybrid vehicles. Work efforts addressed include: production capacity development, nickel plaque development, experimental plaque impregnation measurement, cell development, and battery development. DOE

N84-11995# Sandia Labs., Albuquerque, N. Mex. Div. 2564.
TUBULAR BATTERY AND TRANSISTORIZED CONTROLLER OUTDOOR LABORATORY TEST PROGRAM
Richard R. Bassett and B. E. Barnaby 1983 18 p Presented at the Battery User's Workshop, Washington, 20 Jul. 1983
(Contract DE-AC04-76DP-00789)
(DE83-016231; SAND-83-1216C; CONF-830783-1) Avail: NTIS HC A02/MF A01

Tubular batteries, Eagle-Picher Model No. 3QK-11 were evaluated. Included Transistorized controllers: one manufactured by Electric Vehicle Components, Inc. operating at 400 Hz; and the other manufactured by PMC operating at 4000 Hz. On-board chargers specifically designed for tubular batteries were used. The test vehicles were Electra Van 600, one of which was already in use at SNLA and the other was to be provided by Aerospace. Data would be taken with on-board Curtis Integrators, and when they became available, he Versatile Data Acquisition System being built by MERADCOM. The first vehicle, identified as 314, was modified and became operational on April 5, 1982. Since that time, the vehicle has logged 3787 km. The second vehicle, identified as 312, required extensive repair to the drive train and did not become operational until June 2, 1982. Since that time, the vehicle has logged 1226 km. The evaluation was conducted in actual use conditions. That is, the vehicles were assigned to specific organizations who could assure a significant daily distance (20 to 30 km) traveled. The vehicles are described as modified for the evaluation, data are presented on the charge and discharge characteristics of the batteries in the vehicles and the performance data with temperature effects acquired to date are presented. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N84-11996 Iowa State Univ. of Science and Technology, Ames.
LINEAR AND NONLINEAR MODELS OF MIRA VARIABLE STARS Ph.D. Thesis
Dale A. Ostlie 1982 115 p
Avail: Univ. Microfilms Order No. DA8307775

A survey of linear, nonadiabatic models in the Mira instability region of the H-R diagram was carried out for solar masses ranging from 0.8 to 2.0, with effective temperatures from 2700 K to 3400 K and solar luminosities from 1500 to 7000. From this study period-mass-radius relations were derived for fundamental mode and first overtone pulsation; these relations can then be compared to observations. All models include molecular opacities and an opacity averaging scheme within each zone of rising and falling convective elements. In some models turbulent pressure was also included. The nonlinear behavior of several selected models was also investigated. A time-dependent modulation of the convective velocities was included in all cases. For the 0.8 solar mass model without turbulent pressure, pulsation reached a limiting amplitude but was distinctly aperiodic. When turbulent pressure was included in the 0.8 solar models, pulsation amplitudes increased without limit. For the 1.4 solar mass models studied, turbulent pressure was included and steady fundamental mode pulsation was obtained, but with amplitudes much smaller than are observed for Miras. Dissert. Abstr.

N84-11997 Arizona Univ., Tucson.
INFRARED OBSERVATIONS OF COMETARY SOLIDS Ph.D. Thesis
Humberto Campins Camejo 1982 109 p
Avail: Univ. Microfilms Order No. DA8306449

Infrared photometry was used to determine the physical characteristics of cometary solids. Observations were made of the reflected and thermal parts of the spectra of seven comets. Two of these comets, Bowell and West, were nonperiodic; the other five, Chernyhk, Encke, Kearns-Kwee, Stephan-Oterma, and Tuttle, were periodic. Observations in the 3 micron region of the spectrum of Comet Bowell provide the first direct evidence for

the presence of H2O ice in a comet. The observations of the periodic comets yield the following picture of the dust in this type of object: grains with a size distribution ranging from about 0.3 to 10 microns and peaking around a few microns. These grains were made up of at least two components, a silicate material and an absorbing material. These characteristics are remarkably similar to those of the dust in nonperiodic comets. Comet West is the first case of a splitting comet in which the fragments were observed to have differences in their dusty component. These observations suggest that the nucleus of this comet did not have an 'onion skin' or layered structure but rather had pockets containing dust grains with different size distributions. Based on the results presented, the relation between cometary and interstellar dust, and the origin of comets are discussed.
Dissert. Abstr.

N84-11998 State Univ. of New York, Stony Brook.
TWO-FLUID GRAVITATIONAL INSTABILITIES IN A GALACTIC DISK Ph.D. Thesis
Chanda Jayant Jog 1982 120 p
Avail: Univ. Microfilms Order No. DA8313137

The hydrodynamic equations are solved which describe the galactic disc as a two fluid system where the stars and the gas are treated as two different isothermal fluids of different velocity dispersion, which interact gravitationally with each other. The local, axisymmetric case is considered. Linearized perturbation equations are solved by the method of modes. It is found that even when both the fluids in a two fluid system are separately stable, the joint two fluid system, due to the gravitational interaction between the two fluids in a two fluid system, may be unstable.
Dissert. Abstr.

N84-11999*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
SOLAR EUV, XUV AND SOFT X-RAY TELESCOPE FACILITIES Final Report, 1 May 1977 - 31 Dec. 1981
George L. Withbroe Jan. 1982 42 p refs
(Contract NAS5-24151)
(NASA-CR-170602; NAS 1.26:170602) Avail: NTIS HC A03/MF A01 CSCL 03A

Facility class, high resolution instrumentation can enable maximum spatial, spectral and temporal resolutions and provide understanding of the complex physical conditions in the outer solar atmosphere and the mechanisms responsible for these conditions. The scientific rationale for facility class instruments operating in the EUV, XUV, and soft X ray spectral ranges are discussed. Possible configurations for these facilities and priorities for their development are considered. A.R.H.

N84-12000# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATIONS OF GALACTIC CENTER FOR ANNIHILATION LINE AT 0.511 MeV
U. B. Jayanthi, I. M. Martin, J. Braga, J. A. C. F. Neri, M. V. A. Jardim, and K. R. Rao Oct. 1983 10 p refs Submitted for publication Sponsored by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-2907-PRE/421) Avail: NTIS HC A02/MF A01

The presence of the 0.511 MeV gamma line emission from galactic center is well established from various balloon experiments. Recent results in 1980-82 from balloon and satellite experiments show significant decrease in this line intensity. To confirm these results a large area sodium iodide detector to measure 0.511 MeV line from galactic center was flown on a balloon. The preliminary results indicate flux < .0022 photons 1/square cm s. Author

N84-12001# Committee on Science and Technology (U. S. House).
SPACE TELESCOPE COST, SCHEDULE AND PERFORMANCE
Washington GPO 1983 291 p Hearings before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 29, 14, 16 Jun. 1983
(GPO-24-522) Avail: Subcommittee on Space Science and Applications

The management of the space telescope project is examined with emphasis on the relationship of Space Telescope Institute personnel with NASA and contractors and the roles of the Goddard and Marshall Space Flight Centers. The technical complexity of telescope development, the status of instrument components, and program changes made to provide better performance regarding large costs growth and scheduling delays are examined. A.R.H.

N84-12002*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE FOURTH CAMBRIDGE RADIO SURVEY CATALOGUE (4C) (PILKINGTON, GOWER, SCOTT AND WILLS 1965, 1967)
Wayne H. Warren, Jr. Sep. 1983 14 p refs
(NASA-TM-85456; NAS 1.15:85456; NSSDC/WDC-A-R/S-83-10)
Avail: NTIS HC A02/MF A01 CSCL 03A

The machine readable catalogue contains survey data from the papers of Pilkington and Scott and Gower, Scott and Wills. These data result from a survey of radio sources between declinations -07 deg and +80 deg using the large Cambridge interferometer at 178 MHz. The computerized catalog contains for each source the 4C number, 1950 position, measured flux density, and accuracy class. For some sources miscellaneous brief comments such as cross identifications to the 3C catalog or remarks on contamination from nearby sources are given at the ends of the data records. A detailed description of the machine readable catalog as it is currently being distributed by the Astronomical Data Center is given to enable users to read and process the data. J.M.S.

N84-12003*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE REVISED CATALOGUE OF STELLAR ROTATIONAL VELOCITIES OF UESUGI AND FUKUDA (1982)
Wayne H. Warren, Jr. Oct. 1983 15 p refs
(NASA-TM-85457; NAS 1.15:85457; NSSDC/WDA-A-R/S-83-14)
Avail: NTIS HC A02/MF A01 CSCL 03A

The machine-readable catalog provides mean data on the old Slettebak system for 6472 stars. The catalog results from the review, analysis and transformation of 11460 data from 102 sources. Star identification, (major catalog number, name if the star has one, or cluster identification, etc.), a man projected rotational velocity, and a list of source references re included. The references are given in a second file included with the catalog when it is distributed on magnetic tape. The contents and/ formats of the the data and reference files of the machine-readable catalog are described to enable users to read and process the data. Author

N84-12004*# Washington Univ., St. Louis, Mo. Dept. of Chemistry.
COPERNICUS OBSERVATIONAL SEARCHES FOR OH AND H2O IN DIFFUSE CLOUDS Final Technical Report
William Hayden Smith and Theodore P. Snow, Jr. (Colorado Univ., Boulder) [1983] 40 p refs Submitted for publication
(Grant NsG-5187)
(NASA-CR-170601; NAS 1.26:170601) Avail: NTIS HC A03/MF A01 CSCL 03A

An intensive search for OH and H2O in the directions of sigma Sco, alpha Cam, and micron Per was undertaken with the Copernicus satellite. Multiple scans were carried out over the wavelength region for the expected absorption features due to the OH D-X and H2O C-X transitions. The feature due to OH was detected marginally towards sigma Sco, and only an upper limit can be given towards alpha Cam. H2O was not detected in any of the stars at the signal level accumulated. The OH abundance towards sigma Sco and the respective lower limits for the OH/H2O ratios are discussed with regard to the extant models for the steady state abundances of OH and H2O, and shown not to be inconsistent with ion-molecule schemes. Author

N84-12005# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 465, MAY 1983. PART 1: PROMPT REPORTS. DATA FOR APRIL AND MARCH 1983, AND LATE DATA
Helen E. Coffey, ed. May 1983 119 p 2 Vol.
(PB83-228544; SGD-465-Pt-1; NOAA-83071201-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03A

Alert periods, daily solar indices, solar flares, solar radio emission, inferred interplanetary magnetic field polanitives, mean solar magnetic field, daily solar activity centers, sudden ionospheric disturbance, cosmic rays, geomagnetic indices, and radio propagation indices are considered. Author

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N84-12006 Wisconsin Univ., Madison.
SOME THEORETICAL STUDIES OF THE INTERSTELLAR MEDIUM Ph.D. Thesis
Jose Franco 1982 109 p
Avail: Univ. Microfilms Order No. DA8304266

Various aspects of the interaction of stars with their environments are analyzed. In order to begin the investigation of supernova explosions inside interstellar 'bubbles', Sedov's self-similar blast wave structure for a power law density distribution is reviewed. Calculations over the structure are performed to obtain the total energy content, the shock radius evolution, the electron temperature distribution, and the luminosity of such blast waves. The effects of the stellar wind from the most luminous star in the core of the Orion Nebula are reviewed with the aid of far-ultraviolet satellite observations. In Particular, the production of C(+3) and Si(+3) by three processes: X-ray, ultraviolet, and collisiional ionization is analyzed. It is concluded that those ions are likely produced by ultraviolet ionization of the nebular gas. Under the assumption that molecular clouds are turbulent and clumpy, it is shown that rapidly rotating protostars are likely to be formed. The interaction between the rotating protostars and their parent molecular cloud, via a rotationally driven wind, is analyzed. It is then shown that the dissipation of the protostellar rotational energy can maintain the observed dynamical structure and temperatures in the molecular clouds. As a consequence of this interaction it is proposed that the star formation process is self-regulated. Dissert. Abstr.

N84-12007 Texas Univ., Austin.
THE POLARIZATION AND ANISOTROPY ON LARGE ANGULAR SCALES OF THE MICROWAVE BACKGROUND RADIATION IN HOMOGENEOUS COSMOLOGIES Ph.D. Thesis
Brian Willard Tolman 1982 93 p
Avail: Univ. Microfilms Order No. DA8309205

The polarization and anisotropy of the cosmological microwave background radiation on large angular scales are discussed. A quadrupole anisotropy in the expansion of the universe (shear) is considered in realistic cosmological models and the resulting anisotropies and polarization of the radiation are calculated. The role of spatial curvature is considered separately and it is found to have two profound effects. First, the director of polarization of the radiation will be rotated relative to the anisotropy; however, this will occur only in the standard closed model and the models of Bianchi type VII. The existence of this twist implies that these universes have a handedness property. The second effect of spatial curvature arises in some open models in which a quadrupole anisotropy may be distorted by the spatial curvature so that is resembles a dipole; in the extreme cases all the anisotropy is confined to a region of small angular diameter (a spot). A transfer for polarized radiation in a general curved spacetime is derived.
Dissert. Abstr.

N84-12008 Nevada Univ., Reno.
GROWTH OF EPITAXIAL ICE CRYSTALS ON COVELLITE (CuS) UNDER REDUCED AIR PRESSURE Ph.D. Thesis
Nam Kun Cho 1982 161 p
Avail: Univ. Microfilms Order No. DA8312491

The advance velocity of nonthickening crystals and basal steps were measured as a function of temperature, supersaturation, and air pressure, using an optical interference technique. Ice crystal growth at -7 C in a thermal diffusion chamber was also investigated as a function of supersaturation. The radial growth rates of nonthickening crystals and the advance velocity of a 0.08 micrometer step increased with decreasing pressure suggesting a pressure dependence of vapor diffusivity. Abnormally slow growth of crystals thinner than 0.3 micrometer at 4% supersaturation and the sublimation of thin crystals (< 1 micrometer) in the neighborhood of a thicker crystal indicated that nonthickening crystals are pseudomorphically strained to fit the substrate within a layer some ten atomic spacings thick, above which the strain decreases inversely as the crystal thickness. Results suggest that ice crystal growth follows a two dimensional nucleation combined with a progressive rougnening of the surface with increasing temperature. Dissert. Abstr.

N84-12009 California Univ., Berkeley.
A STUDY OF THE LARGE-SCALE STRUCTURE OF THE PLASMASPHERE USING EXTREME ULTRAVIOLET OBSERVATIONS Ph.D. Thesis
Supriya Chakrabarti 1982 92 p
Avail: Univ. Microfilms Order No. DA8312775

Plasmaspheric ion distributions in the 500 to 30,000 km range were indirectly measured by observing selected lines of solar extreme ultraviolet spectrum resonantly scattered by different ionic species. The observations were made with a broad band photometer on the Apollo-Soyuz mission and an EUV spctrometer on board the STP78-1 satellite. A third experiment was conducted from rocketborne photometers. Several theoretical models of ion distributions were unable to explain the data obtained. A kinetic equilibrium model of ion distribution, which takes the effect of a nonhomogeneous magnetic field into account, was found to explain the observations. The measurements obtained suggest the existence of a bulge in the helium ion distribution in the winter hemisphere, similar to the observed bulge in the neutral helium distribution. The derived midlatitude summer to winter number density ratio of 0.6 is consistent with theoretical calculations based upon the production, loss and transport of helium ions. Due to the limited sensitivity of the EUV spectrometer at the HeII 304 A line, simultaneous He(-) and O(-) densities could not be obtained using this method. Dissert. Abstr.

N84-12010 Yale Univ., New Haven, Conn.
THE BEHAVIOR OF COLD GAS IN SPHEROIDAL GALACTIC POTENTIALS Ph.D. Thesis
Gregory Frank Simonson 1982 166 p
Avail: Univ. Microfilms Order No. DA8310584

The motions of cold gas residing in various spheroidal galactic potential wells are investigated, both analytically and through extensive numerical calculations. It is found that a gaseous layer embedded in the potential has a preferred orientation, in which individual gas clouds have orbits which do not precess. The gas will damp to the preferred orbits, through the combined effects of differential precession and radial excursions from circular trajectories, on time scales of less than one to two billion years for orbits of moderate radius. For elliptical galaxies with embedded gas disks this work provides a clear discriminator between prolate and oblate mass distributions. The preferred gas orbits lie in the equatorial planes of both of these potentials, so if a gas disk is seen projected against the minor axis of an elliptical, that galaxy is truly prolate, while if the lane is aligned with the major axis, the system is oblate. Tabulated observations show that both prolate and oblate ellipticals exist, in perhaps equal numbers. True axial ratios and spatial orientations can also be determined for these objects.
Dissert. Abstr.

N84-12011 California Univ., Davis.
MICROWAVE STUDIES OF HOT INTRACLUSTER GAS Ph.D. Thesis
Robin Wayne Evans 1982 109 p
Avails: Univ. Microfilms Order No. DA8311942

A series of observations conducted to find the hyperfine radio lines of Nitrogen VII and Carbon VI in astrophysical environments are discussed. These lines are equivalent to the hydrogen hyperfine line at 1.4 GHz but occur at higher temperatures whee these atoms ionize to a hydrogen like state. Moreover, the Nitrogen VII line is at 53 GHz and the Carbon VI line at 77.5 GHz. The receivers and the techniques used for these observations are described. The conditions present in large gas clouds in clusters of galaxies are analyzed and it is indicated that the nitrogen and carbon hyperfine lines may be observable with radio astronomy receivers. Thus these clouds may be studied by means of ground based observations. An analysis of other astrophysical conditions that may produce an observable line is also presented. Dissert. Abstr.

N84-12012*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SELF-CONSISTENT MODELS FOR COULOMB HEATED X-RAY PULSAR ATMOSPHERES
A. Harding, P. Meszaros, J. Kirk, and D. Galloway Aug. 1983 49 p refs Submitted for publication
(NASA-TM-85087; NAS 1.15:85087) Avail: NTIS HC A03/MF A01 CSCL 03B

Calculations of accreting magnetized neutron star atmospheres heated by the gradual deceleration of protons via Coulomb collisions are presented. Self consistent determinations of the temperature and density structure for different accretion rates are made by assuming hydrostatic equilibrium and energy balance, coupled with radiative transfer. The full radiative transfer in two polarizations, using magnetic cross sections but with cyclotron resonance effects treated approximately, is carried out in the inhomogeneous atmospheres. Author

N84-12013*# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
SOLAR SYSTEM HISTORY AS RECORDED IN THE SATURNIAN RING STRUCTURE
Hannes Alfven Apr. 1983 33 p refs Sponsored by National Aeronautics and Space Administration and National Science Foundation
(NASA-CR-174477; NAS 1.26:174477; TRITA-EPP-83-04; ISSN-0348-7539) Avail: NTIS HC A03/MF A01 CSCL 03B

Holberg's analysis of the Voyager Saturn photographs in reflected and transparent light, and occultation data of stars seen through the rings are discussed. A hyperfine structure, with > 10,000 ringlets can be explained by the Baxter-Thompson negative diffusion. This gives the ringlets a stability which makes it possible to interpret them as fossils, which originated at cosmogonic times. It is shown that the bulk structure can be explained by the combined cosmogonic shadows of the satellites Mimas, Janus and the Shepherd satellites. This structure originated at the transition from the plasma phase to the planetesimal phase. The shadows are not simple void regions but exhibit a characteristic signature. Parts of the fine structure, explained by Holberg as resonances with satellites, are interpreted as cosmogonic shadow effects. However, there are a number of ringlets which can neither be explained by cosmogonic nor by resonance effects. Analysis of ring data can reconstruct the plasma-planetesimal transition with an accuracy of a few percent. Author (ESA)

N84-12014 Illinois Univ., Urbana-Champaign.
CHARGE TRANSFER CROSS-SECTIONS FOR N V AND S III IONS INTERACTING WITH HYDROGEN ATOMS IN ASTROPHYSICAL PLASMAS Ph.D. Thesis
Carl Arthur Feickert 1983 131 p
Avail: Univ. Microfilms Order No. DA8309940

Standard scattering theory formalisms are set forth, by which reactive cross sections may be deduced, given the required molecular potentials. In addition, two bases for the representation of the molecular wave functions are described along with a simple, semiclassical, analytic approximation to the reactive cross section. This development is continued by rendering these analytic formalisms, for the S(-2) and N(-4)H systems, into quantitative reactive cross sections through the numerical solution of the scattering equations in an appropriate basis. Simple interpretations of the qualitative features of these calculations are then possible and their astrophysical relevance reviewed, with particular attention to the limitations of semiclassical methods utilized by previous investigators of these systems. Dissert. Abstr.

N84-12015 Kentucky Univ., Lexington.
FORMALDEHYDE AS A DENSITY PROBE OF INTERSTELLAR CLOUDS Ph.D. Thesis
Stuart Ambrose Fulkerson 1982 96 p
Avail: Univ. Microfilms Order No. DA8311244

Models of radiative transfer in nonuniform spherical interstellar clouds were constructed for several rotational spectral lines of orthoformaldehyde using the microturbulent approximation. The integrated intensities, T sub A delta V were calculated and compared to the observed integrated intensities from three interstellar clouds: L183, L134, and B361. Comparison between the model cloud calculations and observations yield the molecular hydrogen gas density as a function of source radius and the relative formaldehyde to molecular hydrogen abundance. The success of the models in uniquely fitting the observations lends support to the idea that the microturbulence is the major line broadening mechanism in dark interstellar clouds. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N84-12016 Texas Univ., Austin.
ORBITAL RESONANCES AND PLANETARY ACCRETION IN THE EARLY SOLAR SYSTEM EVOLUTION Ph.D. Thesis
Michael Vincent Torbett 1982 227 p
Avail: Univ. Microfilms Order No. DA8309206

The solar system, in its early evolution, is thought to have consisted of an accretion disk around a growing central protostar. The accretion disk from which the planets ultimately formed can play a significant role in the processes of planetary and solar formation. As well as leading, by thermalization of orbital motions in the disk, to bipolar flows in the T Tauri stage of stellar evolution, the disk can influence the course of planetary accumulation. By virtue of its essentially solar composition, Jupiter was formed before the accretion disk was removed. This first formed planet then gravitationally imposed a harmonic structure on the planetesimal swarm through its commensurability resonances. Accelerated growth of planetesimals in orbital resonance with Jupiter resulted in runaway growth producing planetary embryos. These embryos accelerated growth at their own resonances in a process that propagation inward and outward forming a resonant configuration of embryos. Dissert. Abstr.

N84-12017 California Univ., Berkeley.
DYNAMICS OF SATURN'S RINGS Ph.D. Thesis
Jack Jonathan Lissauer 1982 112 p
Avail: Univ. Microfilms Order No. DA8312894

A dynamical study of Saturn's rings is presented. Emphasis is placed on the gravitational effects of external and possible embedded satellites. The locations and strengths of resonances between ring particles and Saturn's known moons are computed. Spiral density waves are seen to be one of the major consequences of resonances within the rings comparison of theoretical calculations with observed waves allows local surface mass densities to be determined and used to estimate the overall mass of the rings.

The theory of forced spiral bending waves is developed, and applied to several features within the rings. The ring warp caused by these waves may explain the 1-2 kilometer apparent thickness of the rings when observed edge-on from Earth. Measurement of the ring viscosity from the damping of bending waves is estimated to be about 30 meters. Several gaps and ring edges are identified with resonances; however, many prominent gaps are nonresonant. Dissert. Abstr.

N84-12018*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
RADIOACTIVITES IN RETURNED LUNAR MATERIALS AND IN METEORITES Final Report, 1 Feb. 1971 - 31 May 1983
Edward L. Fireman Sep. 1983 7 p
(Grant NGR-09-015-145)
(NASA-CR-171710; NAS 1.26:171710) Avail: NTIS HC A02/MF A01 CSCL 03B

The cosmic-ray, solar-flare, and solar-wind bombardments of lunar rocks and soils and meteorites were studied by measurements of tritium, carbon-14 and argon radioactivity. The radioactivity integrates the bombardment for a time period equal to several half-lines. H-3, Ar-37, Ar-39, C-14. For the interior samples of lunar rocks and for deep lunar soil samples, the amounts of the radioactivities were equal to those calculated for galactic cosmic-ray interactions. The top near-surface samples of lunar rocks and the shallow lunar soil samples show excess amounts of the radioactivities attributable to solar flares. Lunar soil fines contain a large amount of hydrogen due to implanted solar wind. Studies of the H-3 in lunar soils and in recovered Surveyor-3 materials gave an upper limit for the H-3/H ratio in the solar wind of 10 to the -11th power. Solar wind carbon is also implanted on lunar soil fines. Lunar soils collected on the surface contained a 0.14 component attributable to implanted solr wind C-14. The C-14/H ratio attributed to the solar wind from this C-14 excess is approximately 4 x 10 to the -11th power. A.R.H.

N84-12019*# Arizona State Univ., Tempe. Dept. of Geology.
EROSION AND TRANSPORT OF EOLIAN MATERIALS ON MARS Final Report, 15 Apr. 1982 - 15 Sep. 1983
David Krinsley 16 Oct. 1983 18 p refs
(Grant NAGw-24)
(NASA-CR-174569; NAS 1.26:174569) Avail: NTIS HC A02/MF A01 CSCL 03B

An abrasion chamber was constructed to produce grain to grain impacts and to eliminate, as far as possible, grain to wall impact. Quartz, basalt, olivine, and volcanic ash were used as abrasives to determine particle longevity on Mars during eolian abrasion. The various abrasion velocities, measured velocity or particles, calculated velocity of collision, time during which abrasion took place, the charge (material) in grams, and the percent remaining after completion are tabulated. The tests show that if coarse sand-sized particles of the composition presumably present on Mars are moved at the wind velocities given, almost complete destruction can occur in geologically insignificant time periods. Grain to rock collisions are not necessary for almost complete destruction; grain to grain collisions are sufficient. A.R.H.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N84-12020# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
INFLUENCE OF THE MAGNETIC FIELD IN THE TEMPORAL EVOLUTION OF SOLAR FLARE X-RAY AND MICROWAVE RADIATION M.S. Thesis [INFLUENCIA DO CAMPO MAGNETICO NA EVOLUCAO TEMPORAL DA RADIACAO DE EXPLOSOES SOLARES EM RAIOS X E MICROONDAS]
Joaquim Eduardo Rezende Costa Aug. 1983 76 p refs In PORTUGUESE; ENGLISH summary
(INPE-2842-TDL/140) Avail: NTIS HC A05/MF A01

A theoretical development, self-consistent with recent models for the explosive source, is applied to time delays of peak emission at different microwave frequencies, and between microwaves and hard X-ray emission. A working hypothesis is assumed with the adoption of a growing magnetic field during the solar flare explosion, and therefore contributing to a growth in microwave emission, differential in frequency, producing delays of maximum emission towards lower microwave frequencies, and delays of microwave maximum emission with respect to hard X-rays. It is found that these delays are consistent with a growth in the magnetic field of about 14% by assuming both thermal and non-thermal models. This variation in magnetic field is associated to movements of thermal sources downwards in the solar atmosphere, and it is found that the estimated velocities of displacement were consistent compared to characteristic velocities of anomalous conduction fronts of thermal models. Author

N84-12021*# Hawaii Univ., Honolulu. Inst. for Astronomy.
THE MODELLING OF THE SOLAR UPPER PHOTOSPHERE AND LOWER CHROMOSPHERE BASED UPON ATM DATA Final Technical Report
James N. Heasley Sep. 1983 10 p refs
(Contract NAS8-33219)
(NASA-CR-170920; NAS 1.26:170920) Avail: NTIS HC A02/MF A01 CSCL 03B

Spectral data obtained by the SO82B experiment aboard SKYLAB were used to critically evaluate existing models of the solar upper photosphere and lower chromosphere. These spectral diagnostics were used to develop new solar models. Author

N84-12022# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 464, APRIL 1983. PART 2: (COMPREHENSIVE REPORTS). DATA FOR OCTOBER 1982 AND MISCELLANEA
Helen E. Coffey Oct. 1982 43 p refs
(PB83-222497; SGD-464-Pt-2; NOAA-83062203-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Solar radio emission, solar X ray radiation, and mass ejections from the sun are discussed. Author (GRA)

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N84-12023 Colorado Univ., Boulder.
RADIO EMISSION FROM SOLAR AND STELLAR CORONAE Ph.D. Thesis
Dale Everett Gary 1982 269 p
Avail: Univ. Microfilms Order No. DA8309844

Several problems in radiophysics are explored. Polarization measurements f two types of solar bursts--Reverse Drift Pairs and Type V bursts--allowed identificatioon of the radiation as due to fundamental plasma emission for RDPs and harmonic plasma emission for Type Vs. Two other types of solar radio burst--Type II (shock related) and Type IV are studied with the aid of coronagraph/polarimeter (C/P) observations. Together, the radio and C/P data indicate the presence of two separate shocks in the coronal transient event. One shock, without radio emission, led the transient and was driven by it. Estimates of the density enhancement caused by the shock give Mach number 1.2 < M sub A > 3 and, hence, magnetic field strength in the ambient corona 0.05 < B > gauss. The second shock, which gave rise to the radio emission, was associated with the loops.
Dissert. Abstr.

N84-12024 California Univ., Berkeley.
X-RAY AND OPTICAL STUDIES OF EXTRAGALACTIC X-RAY EMITTERS Ph.D. Thesis
Gail Anne Reichert 1982 224 p
Avail: Univ. Microfilms Order No. DA8312944

This work deals with the two major known classes of extragalactic X-ray emitters: clusters of galaxies, and active galactic nuclei. HEAO 1 A-2 LED spectra of eight clusters of galaxies--the Virgo, Perseus, Coma, and Centaurus clusters, Abell 2147, SC 1329-314, Abell 2319, and Abell 133-- are presented. L shell iron lines at 1.1 keV were observed in the spectrum of the Virgo cluster, indicating the presence of approximately cosmic abundances of heavy elements in this cluster. Spectral analysis indicates that at least two spectral components are required to describe the emission from the Centaurus cluster, Abell 2147, and SC 2139-314. The spectra of the other five clusters are adequately represented by isothermal models. The X-ray and optical properties of the eight clusters are discussed in the light of the evolutionary classification scheme proposed by Forman and Jones (1982). New optical identifications of forty-three objects from a sample of 145 serendipitous Einstein X-ray sources are presented. Twenty-eight are identified with active galaxies and quasars.

Dissert. Abstr.

N84-12025# Chicago Univ., Ill.
ORIGIN OF THE ULTRA-HIGH-ENERGY COSMIC RAYS
David N. Schramm and Christopher T. Hill (Fermi National Accelerator Lab.) Apr. 1983 5 p refs Presented at 18th Intern. Cosmic Ray Conf., Bangalore, India, 22 Aug. 1983
(Contract DE-AC02-76CH-03000)
(DE83-013760; FERMILAB-Conf-83/36-THY; CONF-830830-3)
Avail: NTIS HC A02/MF A01

The nature of the cosmic ray spectrum above 10(19) eV which discriminates between possible primary source models in a limited way is discussed. The shape of the spectrum, apart from normalization, is universal after a few photomeson interaction lengths. Fundamental processes, those sensitive to physics at, e.g., the grand unification scale, are energy efficient and may be necessary to account for the normalization of the spectrum at the GZ cut-off. Very distant cosmological sources of this kind can generate significant structure above 10(19) eV. Local sources are not required and may even be problematic. DOE

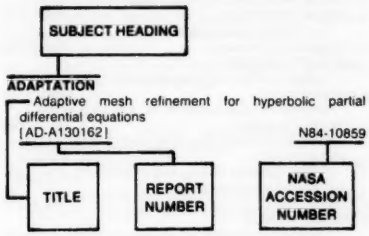
99 GENERAL

N84-12026*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RESEARCH AND TECHNOLOGY, 1983 Annual Report
Nov. 1983 96 p
(NASA-TM-85702; NAS 1.15:85702) Avail: NTIS HC A05/MF A01 CSCL 05B

Highlights of major accomplishments and applications made during the past year illustrate the broad range of research and technology activities at the Langley Research Center. Advances are reported in the following areas: systems engineering and operation; aeronautics; electronics; space applications; aircraft and spacecraft structures; composite structures; laminar flow control; subsonic transport aircraft; and supersonic fighter concepts. Technology utilization efforts described cover a hyperthermia monitor, a lightweight composite wheelchair; and a vehicle ride quality meter. A.R.H.

SUBJECT INDEX

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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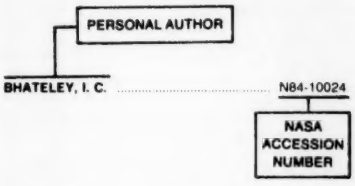

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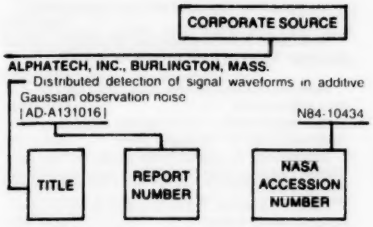

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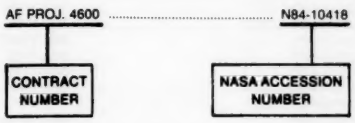

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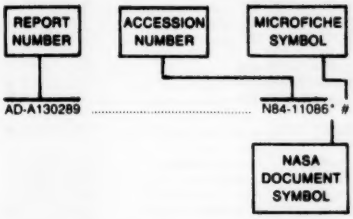

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